Supreme Court, U.S.
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In The

Supreme Court of the United States

800 ADEPT, INC.,

Petitioner,

v.

MUREX SECURITIES, LTD., MUREX LICENSING CORPORATION, TARGUS INFORMATION CORPORATION, and WEST CORPORATION,

Respondents.

On Petition For A Writ Of Certiorari To The United States Court Of Appeals For The Federal Circuit

APPENDIX TO PETITION FOR WRIT OF CERTIORARI VOLUME I

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United States Court of Appeals for the Federal Circuit

2007-1272, -1356

800 ADEPT, INC.,

Plaintiff-Appellee,

v.

MUREX SECURITIES, LTD., MUREX LICENSING CORPORATION, TARGUS INFORMATION CORPORATION, and WEST CORPORATION,

Defendants-Appellants.

Stephen D. Milbrath, Allen, Dyer, Doppelt, Milbrath & Gilchrist, P.A., of Orlando, Florida, argued for plaintiff-appellee. With him on the brief were Brian R. Gilchrist and Stephen H. Luther.

William F. Lee, Wilmer Cutler Pickering Hale and Dorr, LLP, of Boston, Massachusetts, argued for defendants-appellants. With him on the brief were Lisa J. Pirozzolo and Benjamin M. Stern, and Paul R.Q. Wolfson, of Washington, DC.

Appealed from: United States District Court for the Middle District of Florida

Chief Judge Patricia C. Fawsett

DECIDED: August 29, 2008

Before GAJARSA, Circuit Judge, PLAGER, Senior Circuit Judge, and DYK, Circuit Judge.

Opinion for the court filed by Senior Circuit Judge Plager. Circuit Judge Dyk concurs in the result.

PLAGER, Senior Circuit Judge.

This patent case involves technology for routing "1-800" telephone calls to an appropriate service location, e.g., the service provider closest to the customer who placed the call. Plaintiff 800 Adept, Inc. ("Adept") and Defendant Targus Information Corporation ("Targus") sell competing services that are used to route calls made to 800 numbers, and both companies own patents covering systems and methods for call routing. Their customers include owners of 800 numbers, such as Enterprise Rent-A-Car and Pizza Hut, as well as providers of telecommunications 'platforms'[1] that route 800 calls for such businesses.

In 2002, Adept sued Targus, its affiliated companies Murex Securities, Ltd. and Murex Licensing

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[1] A platform is one or more computers linked to a long distance or local telecommunications network and is used to handle telephone calls requiring special services.

Corporation, and its customer West Corporation[2] in the United States District Court for the Middle District of Florida, alleging that services sold by Targus infringed two patents owned by Adept.[3] Adept further alleged that Targus had tortiously interfered with Adept's business relationships by asserting Targus's patents against Adept's customers. Targus filed counterclaims alleging that Adept's call routing services infringed various claims in several Targus patents.[4]

After a 24-day jury trial, the jury's verdict essentially found for plaintiff Adept on all issues. The jury found that Targus willfully infringed the asserted claims of Adept's patents and that Adept did not infringe the asserted claims of Targus's patents. The jury found that all the asserted claims of Targus's patents were invalid and further found that the

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[2] The Defendants will be collectively referred to as "Targus" throughout the remainder of this opinion unless otherwise indicated.

[3] The Adept patents at issue in this case are U.S. Patent No. Re. 36,111 ("the '111 patent"), which is a reissue of U.S. Patent No. 5,588,048, and U.S. Patent No. 5,805,689 ("the '689 patent"), collectively referred to as the "Neville patents."

[4] The Targus patents at issue are U.S. Patent No. 4,757,267 ("the '267 patent" or "Riskin patent") and U.S. Patent Nos. 5,506,897 ("the '897 patent"), 5,848,131 ("the '131 patent"), 5,901,214 ("the '214 patent"), 5,907,608 ("the '608 patent"), 5,910,982 ("the '982 patent"), 5,956,397 ("the '397 patent"), 5,982,868 ("the '868 patent"), 6,058,179 ("the '179 patent"), and 6,091,810 ("the '810 patent"), collectively referred to as the "Moore-Shaffer patents."

unasserted claims of Targus's '897 patent and '131 patent were invalid as well. The jury also found Targus liable under state law for tortious interference with Adept's business relationships. The jury awarded Adept $18 million for patent infringement and $7 million on the tortious interference claim.

The trial court entered judgment on the jury verdict, issued a permanent injunction, and awarded enhanced damages of $24 million on the patent infringement claim, bringing the total damages award to $49 million. The trial court also determined that the case was exceptional and therefore Adept was entitled to attorney fees under 35 U.S.C. § 285.

After thorough consideration of all the issues in the case, we conclude that the trial court erred regarding a critical claim construction issue in the Adept patents, one that permitted the jury to make incorrect findings. Under the correct claim construction, no reasonable jury could find that Targus infringes the asserted claims of Adept's patents; accordingly, we reverse the trial court's judgment of infringement. For the reasons we shall explain, we also reverse the trial court's judgment for Adept on its tortious interference claim. In light of these determinations, we vacate the trial court's damages award, the permanent injunction, and the judgment with respect to willfulness, enhanced damages, and attorney fees.

Regarding the Targus patents, with two exceptions we affirm the trial court's judgment upholding

the jury's verdict that the asserted claims of Targus's patents are invalid; for the reasons we explain, we vacate the invalidity judgment on two of the asserted claims of Targus's patents and remand for a new trial on these claims. Because the validity of the unasserted claims of Targus's patents was not at issue during the trial, we vacate the trial court's invalidity judgment with respect to all of those claims.

BACKGROUND

The patents at issue in this case relate to technology for routing telephone calls made to 800 numbers. Typically when a caller dials an 800 number, the long distance carrier ("LDC") handling the call must identify the 10-digit telephone number, known as a "Plain Old Telephone System" ("POTS") number, to which to route the call. (A POTS number has the form NPA-NXX-XXXX, where NPA is the area code and NXX is the exchange.) If all calls to a particular 800 number are to be routed to a single location, the process is relatively simple. Some businesses, however, advertise a single 800 number but have multiple service locations. When a caller dials the 800 number of one of these businesses, the LDC must have some way to determine the POTS number of an appropriate service location. For example, if the 800 number is for a chain of pizza restaurants, the correct service location could be the closest restaurant or one that delivers within the geographic area in which the caller is located.

Plaintiff Adept owns the '111 patent and its divisional, the '689 patent, both of which claim priority to an application filed on July 31, 1992. The two patents, referred to as the Neville patents, are entitled "Geographically Mapped Telephone Routing Method and System," and have virtually identical written descriptions.[5] The Neville patents disclose a method for directly routing an 800 call to the appropriate service location based on the caller's 10-digit telephone number (NPA-NXX-XXXX), sometimes referred to as the Automatic Number Identification ("ANI"). The invention involves the construction of a database that assigns a service location POTS number to every potential caller according to geographic criteria provided by the owner of the 800 number. This database can be provided to the LDC, which then routes calls made to the 800 number according to the routing instructions in the database. The process is summarized in the patent's abstract:

> A method and system for direct routing of telephone calls made by a caller originating from within specific calling areas to one of a plurality of locations of a second party according to certain criteria established by the second party. This routing is accomplished based on the assignment of latitude and longitude coordinates to a potential caller's location. Once these coordinates are assigned to

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[5] For convenience, this opinion cites only to the written description of the '111 patent.

> each of the potential callers, the second party's criteria is applied to assign the potential caller to a second party. Such criteria could be existence within a previously-defined geographic area, a custom defined geographic area, or through calculations such as the shortest distance between coordinate points. *Once all such assignments have been made, a database is assembled to be used by a long distance carrier for direct routing of telephone calls from callers to an assigned second party.*

'111 patent, abstract (emphasis added).

The '111 patent has five independent claims, and the '689 patent has one independent claim, all of which were asserted by Adept against Targus. Claim 1 and claim 17 of the '111 patent are system claims; claim 9 and claim 29 of the '111 patent are method claims; and claim 41 of the '111 patent and claim 1 of the '689 patent are directed to a method of constructing a database. Claim 29, a method claim, is illustrative of the Adept patent claims:

> 29. A method for *direct routing* a telephone call from a first party who has an originating telephone number at a physical location and who dials a telephone number including digits uniquely characteristic to a second party having a plurality of service locations, said method comprising the steps of:
>
> [a] allocating latitude and longitude coordinates to the physical location of all potential first parties;

> [b] defining the boundaries of one or more geographical areas which can be of any size and shape according to predetermined criteria, each point along said boundaries being defined by latitude and longitude coordinates;
>
> [c] *assigning to the physical location of said potential first parties a telephone number of a service location of a second party that will receive calls* originating from within the boundary of a geographic area in which the latitude and longitude coordinates of the physical location of each of said potential first parties lie;
>
> [d] determining the originating telephone number of the first party from which said telephone call is to be routed; and
>
> [e] *directly routing* said telephone call to a service location of the second party assigned to said originating telephone number of the first party by said step of assigning.

'111 patent, col. 15 ll.19-45 (emphases and paragraph lettering added).

Defendant Targus owns two families of patents referred to as the Moore-Shaffer patents, which, like the Neville patents, disclose various systems and methods for routing 800 calls to an appropriate service location based on the caller's 10-digit telephone number. The first family includes seven patents: the '897 patent; its continuation-in-part, the '131 patent; its continuation-in-part, the '868 patent;

and its four continuations, the '608 patent, the '982 patent, the '397 patent, and the '810 patent. The second family includes the '214 patent and its continuation, the '179 patent.

The earliest Moore-Shaffer patent is the '897 patent, which claims priority to an application filed on February 22, 1993. The '897 patent, which issued in 1996, was also the subject of a reexamination request filed by Adept in 1999. The United States Patent and Trademark Office ("PTO") granted the request and in 2001 issued a reexamination certificate, confirming the patentability of all claims.

The '897 patent discloses a database containing two tables – a master table and a client table – linked by a spatial key. Each record in the master table contains a caller telephone number and a corresponding spatial key, such as a nine-digit postal code (referred to as "zip+4"). '897 patent, col.8 l.55 to col.9 l.6. Each record in the client table contains a spatial key and the telephone number of a corresponding client service location. *Id.* at col. 9 ll.7-26. The master table is indexed by caller telephone numbers, and the client table is indexed by the spatial key, so that when a call is placed the system retrieves from the master table the spatial key corresponding to the caller's telephone number and then retrieves from the client table the telephone number of the client service location corresponding to that spatial key. *Id.* at col.10 ll.1-7. The '897 patent describes two methods for constructing the client table, one involving radius-defined service areas and one

involving polygon-defined service areas for each service location. *Id.* at col.15 l.52 to col. 28 l.5. The '131 patent, a continuation of the '897 patent, is similar to the '897 patent but additionally includes a third table containing specific service location information, such as store hours, that may be recited to the caller by a Voice Response Unit. '131 patent col.31 ll.27-53.

With the '868 patent, a continuation-in-part of the '131 patent, Moore and Shaffer introduced several new embodiments. One of these was a "real-time" system, in which spatial calculations are performed during the call to determine the appropriate service location for a caller. '868 patent col.45 l.35 to col.55 l.50. As in the '897 patent, the service area for each client service location can be defined as an area with a radius of any size or a polygon of any size and shape. *Id.* at col.47 ll.14-17. Unlike the two-table system first described in the '897 patent, however, the real-time system does not simply retrieve records from tables to obtain a service location for a caller. Instead, after a call is placed, the system creates a window key (e.g., a rectangular area defined by longitude and latitude coordinates) that is associated with the caller's location. *Id.* at col.51 ll.26-42. Based on this window key, the system builds a list of potential service locations and then performs more detailed spatial calculations to generate a final list of service locations whose service areas encompass the caller's location, in ascending order of distance between the caller's location and the service location. *Id.* at col.51

l.42 to col.54 l.45. The claims of the '868 patent are directed to various aspects of the real-time system and process.

The four continuations of the '868 patent – the '608 patent, '982 patent, '397 patent, and '810 patent – have the same written description as the '868 patent. While some claims of these patents are directed to the real-time system, many are directed to other embodiments, including, for example, a single-table database, referred to as a "telephone number to telephone number" ("TNTTN") table, which is essentially a merger of the master and client tables first disclosed in the '897 patent.

The second family of Moore-Shaffer patents includes the '214 patent and '179 patent. They disclose spatial key-linked, multi-table databases for providing information to callers or service locations. The processes described in the '214 and '179 patents for applications that require connecting a caller to a service location are similar to the process described in the '131 patent.

Targus sells services that operate in conjunction with telecommunications platforms to route 800 calls. One service, IntelliRouting Express, uses the real-time process described in Targus's '868 patent to identify the location of a caller and determine an appropriate service location after the call is placed and while the caller remains on the line. The service provides the telephone number of the correct service location to the platform, which then processes the

call. Another Targus service, Location Express, merely identifies the latitude/longitude location of the caller and provides it to the platform, which then uses that information while the caller is on the line to perform whatever calculations are necessary to determine an appropriate service location.

Plaintiff Adept alleged that Targus's IntelliRouting Express and Location Express services literally infringe all six independent claims of the Neville patents and several dependent claims. Two key claim construction issues before the trial court concerned the "directly routing" (paragraph [c] in illustrative claim 29, above) and "assigning" (paragraph [c]) limitations in the Neville patents. The case was initially assigned to District Judge Antoon, who construed the term "directly routing" in the Neville patents to mean "routing a telephone call to another party without a human or computer re-dialing or otherwise placing a second call." *800 Adept, Inc. v. Murex Secs., Ltd.*, No. 6:02-CV-1354, slip op. at 38 (M.D. Fla. May 27, 2005).

Subsequently, the case was transferred to Chief Judge Fawsett three months before trial. On Targus's motion, she construed the claim language in the "assigning" limitation, language that is present in all of the asserted claims of the Neville patents. First, she construed the term "potential first parties" as "individuals who can place a telephone call but have not yet done so." *800 Adept, Inc. v. Murex Secs., Ltd.*, No. 6:02-CV-1354, slip op. at 16 (M.D. Fla. Aug. 3, 2006). She then construed "assigning" as referring to

"a designation made *prior* to the telephone call of the first parties" (emphasis added). However, she declined to find that there was a disclaimer of calculations made *after* the call is placed. *Id.* at 19-22. She further held that the claims are not limited to a database containing a single look-up table. *Id.* at 18-19.

During trial, a critical issue in Adept's infringement case against Targus was whether Targus's "real-time" process, which performs spatial calculations during the call to determine an appropriate service location, satisfies the "assigning" limitation in the claims of the Neville patents. Adept's counsel argued that the court's construction of the term "assigning" should be modified so the jury would understand it to cover "a stored procedure and algorithm in the database that constitutes a, quote, assignment, closed quote, but nevertheless makes that calculation while the caller is on-line." (Trial Tr. 254:7-10, Oct. 20, 2006). On the nineteenth day of trial, in response to Adept's argument, and over the objection of Targus's counsel, Chief Judge Fawsett added a sentence to the claim construction. The final jury instruction regarding this limitation read:

> The term "*assigning*" as used in the third element of the claims of the '111 and '689 Patents refers to "*a designation made prior to the telephone call of the first parties.*" However, the '111 and '689 patents do not exclude calculations made during the telephone call.

As we explain more fully below, the addition of the "However . . . " sentence to the assigning limitation changed the dynamic of the trial.

The jury ruled in Adept's favor on all of its patent infringement allegations against Targus, finding that Targus infringed all six independent claims and the asserted dependent claims of the Neville patents and that those claims were not invalid or unenforceable. The jury also found that Targus's infringement was willful.[6] In addition, the jury found that Targus tortiously interfered with the business relationships between Adept and its customers and further found that Targus acted in bad faith. The jury awarded Adept $18 million in patent infringement damages and $2 million in compensatory damages and $5 million in punitive damages on the tortious interference claim.

Adept also prevailed at trial on all issues related to Targus's patents. The jury found that Adept did not infringe any of the asserted claims of Targus's patents. Regarding the validity of Targus's patents, the jury determined that *all* claims of the '897 patent and the '131 patent were invalid, even though Targus asserted only claim 69 of the '897 patent and claims 1 and 50 of the '131 patent. The jury also found that the

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[6] The jury found that Targus's customer West infringed the asserted system and method claims but not the database claims and further found that West's infringement was not willful.

asserted claims of the other Moore-Shaffer patents were invalid.[7]

Targus filed a renewed motion for judgment as a matter of law and an alternative motion for a new trial, both of which the trial court denied without discussion. The trial court awarded Adept an additional $24 million in enhanced patent infringement damages in accordance with 35 U.S.C. § 284, bringing the total damages award to $49 million. The court then entered final judgment and a permanent injunction. The trial court also determined that the case was exceptional under 35 U.S.C. § 285 and that Adept was entitled to attorney fees, but the court denied the motion for attorney fees without prejudice to reassertion after completion of the appellate process.

Targus appeals the judgment with respect to infringement of Adept's patents, the invalidity of Targus's patents, tortious interference, and willfulness. Targus also appeals the jury's damages award, the trial court's award of enhanced damages, and the trial court's determination that Targus was entitled to attorney fees. Finally, Targus challenges the permanent injunction as vague or overbroad. We have jurisdiction pursuant to 28 U.S.C. § 1295(a)(1).

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[7] The asserted claims of the other Moore-Shaffer patents were claim 19 of the '214 patent, claim 25 of the '179 patent, claim 46 of the '868 patent, claims 1 and 20 of the '608 patent, claims 4 and 13 of the '982 patent, claim 1 of the '397 patent, and claim 10 of the '810 patent.

DISCUSSION

I. Adept Patents

Targus contends that the trial court erred in failing to enter judgment as a matter of law that the accused Targus services do not infringe the asserted claims of the Neville patents. Targus focuses on the two claim limitations previously noted – "assigning" and "directly routing." Regarding the assigning limitation, Targus argues that the trial court erred in modifying its claim construction in a way that allowed Adept to argue at trial that the assignment could be done during the call. Under the proper construction of "assigning," Targus maintains, its services do not infringe the claims of the Neville patents. Because we agree with Targus that under the correct claim construction no reasonable jury could find that Targus's services perform the "assigning" step, we need not address Targus's arguments with respect to the "directly routing" limitation.

A. Claim Construction – the "Assigning" Limitation

Targus argues that the claims in the Neville patents require assignment of a service location telephone number to the telephone number of each potential caller before any call is placed. Adept does not dispute that the assignment must occur before a call is placed, but argues that the assigning limitation can be satisfied by placing "in or with" a database an algorithm or criteria for determining the correct

service location, even though the calculations necessary to implement the algorithm or apply the criteria are performed during the telephone call. Targus responds that any calculations needed to complete the assignment of service location numbers to potential callers must occur before the call. The ultimate question, then, is not when the assigning step must occur, which the parties agree must be prior to any telephone call, but rather what constitutes an assignment. To that end, Targus argues that the trial court erred when it added to its original claim construction the "However . . . " statement that the patents "do not exclude calculations made during the telephone call" because that allowed the jury to apply Adept's flawed interpretation.

Though in claim construction matters we give due weight to a trial court's claim construction, ultimately claim construction is a matter of law the final responsibility for which lies with us. *Cybor Corp. v. FAS Techs., Inc.*, 138 F.3d 1448, 1456 (Fed. Cir. 1998) (en banc). As usual, we start with the language of the claims themselves. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc). The relevant language (*see, e.g.*, claim 29 of the '111 patent, above) is: "assigning to the physical location of said potential first parties a telephone number of a service location of a second party that will receive calls. . . . "[8]

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[8] The other independent claims either include identical language or refer to the "originating telephone number" of said

(Continued on following page)

'111 patent col. 15 ll.33-35. Use of the word "potential" to describe the callers and use of the future tense ("will receive calls") for the recipient points directly to the conclusion that the assigning step must occur before a call is placed. The plain language of the claims makes clear that the "assigning" step requires that "a telephone number of a service location" be assigned to each potential caller. Nothing in the claims suggests that storing an algorithm that will be used to determine the telephone number of the correct service location *during a telephone call* constitutes an assignment of a service location telephone number to a potential caller *before a telephone call is placed.*

The patents' written description confirms this. *See Phillips*, 415 F.3d at 1315-17. The Neville patents disclose a method for routing 800 calls using routing instructions contained in a database. According to the written description, the database is constructed by assigning the telephone number of an appropriate service location to each potential caller. '111 patent fig. 1, col. 11 ll.42-54. The assignments are made by applying customer-provided criteria, such as "existence within a previously-defined geographic area, a custom defined geographic area, or through calculations such as the shortest distance between coordinate points." *Id.* abstract. As summarized in the

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potential first parties (i.e., callers) rather than their "physical location."

abstract, the patents make clear that assignment of service location telephone numbers to potential callers must be completed before a telephone call is ever placed: "*Once all such assignments have been made,* a database is assembled *to be used* by a long distance carrier for direct routing of telephone calls." *Id.* (emphasis added).

The assigning step in the Neville patents results in "direct routing instructions" that are submitted to an LDC to be used for routing calls. Adept argues that these routing instructions could include stored procedures such as the distance calculations mentioned in the abstract. The written description, however, does not support Adept's position. The "routing instructions" are always described as a database containing potential caller telephone numbers and corresponding service location telephone numbers. *Id.* col.4 ll.10-12, col.12 ll.48-51. To the extent that procedures like distance calculations are implemented or geographic criteria are applied, it is only to construct a database containing assignments of service locations telephone numbers to potential callers, a step that is completed prior to any call. Nowhere do the patents characterize the routing instructions given to an LDC as a stored procedure, algorithm, or criteria to be used later during a call to determine an appropriate service location telephone number.

Statements made by the applicant during prosecution reinforce the conclusion that any calculations necessary for assigning service location telephone numbers to callers must be performed before any

calls are placed. *See Phillips*, 415 F.3d at 1317 ("[T]he prosecution history can often inform the meaning of the claim language by demonstrating how the inventor understood the invention. . . . "). During prosecution of the original application that led to the Neville patents, the examiner rejected most of the claims as anticipated by a prior art patent to Finucane, et al. ("Finucane"). In response, the applicant distinguished Finucane on several grounds, one of which was that Finucane "requires . . . a computer [to] perform 'point of origin' to 'point of termination' calculations while a caller is on the line." J.A. 8572. The applicant contrasted this feature with his system, which "performs all such calculations prior to the call even being made and, in fact, prior to delivery of the data base to the Long Distance Carrier (LDC)." *Id.*

The examiner maintained his rejection during prosecution of a continuation application. In remarks accompanying an amendment in which he canceled all independent claims and added new claims, the applicant once again distinguished his invention from Finucane:

> The major difference [between the present invention and Finucane] is that with the present invention *all point of origin to point of termination calculations have already been performed* by determining in which response zone (client-defined polygon) the call originated, and to which corresponding terminating number the call should be routed. The results of these calculations are stored in a database at the service provider's location.

> *Thus, the present invention eliminates the need to perform online-calculations to determine the appropriate terminating number.*

J.A. 8626 (emphasis added). Thus Adept and Neville repeatedly characterized the invention as one in which all calculations necessary for assigning service location telephone numbers to callers are performed before any telephone calls are made.

Adept argues that it is improper to rely on these statements from the prosecution history because they are too ambiguous to serve as a "clear and unmistakable" disavowal of claim scope. *See Omega Eng'g, Inc. v. Raytek Corp.*, 334 F.3d 1314, 1325-26 (Fed. Cir. 2003). Adept points out that the issued claims are quite different from those pending at the time the statements were made. Because there is no link between the applicant's arguments and the specific claim language at issue, Adept asserts, there can be no disclaimer.

The doctrine of prosecution disclaimer to which Adept refers is typically invoked to limit the meaning of a claim term that would otherwise be read broadly. *See id.* at 1324 ("[W]here the patentee has unequivocally disavowed a certain meaning to obtain his patent, the doctrine of prosecution disclaimer attaches and *narrows the ordinary meaning of the claim* congruent with the scope of the surrender." (emphasis added)); *see also Rheox, Inc. v. Entact, Inc.*, 276 F.3d 1319, 1325 (Fed. Cir. 2002) (construing the broad term "calcium orthophosphate" to exclude monocalcium

orthophosphate based on prosecution disclaimer although excluded compound was within the ordinary and accustomed meaning of the claim term); *Southwall Techs., Inc. v. Cardinal IG Co.*, 54 F.3d 1570, 1576-77 (Fed. Cir. 1995) (holding that "sputter-deposited dielectric" could not be formed by a two-step process because patentee argued during prosecution that it was formed by a one-step process). In this case, however, we do not consult the prosecution history for that purpose. We simply use it as support for the construction already discerned from the claim language and confirmed by the written description, i.e., that all calculations necessary to assign a service location telephone number to a potential caller are completed before any call is placed. Although the claims pending at the time of the quoted statements did not include the "assigning" limitation, the applicant was quite clear throughout prosecution that his invention performed calculations for assigning service location telephone numbers to callers prior to any call being placed. As is true of the written description, nothing in the prosecution history supports Adept's position that a stored algorithm constitutes an assignment of a service location to a caller.

Adept asserts that a claim construction requiring all calculations to be performed prior to any telephone calls cannot be correct because even its preferred embodiment performs some calculations during the telephone call. Specifically, Adept claims that when a call arrives, the Neville system must perform "lookup" calculations to retrieve from the

database the service location assigned to the caller. Adept fails to recognize, however, that these lookup calculations are not part of the assigning step in the Neville patents – service location telephone numbers are assigned to callers when the database is created, i.e., before any calls take place. Under the correct claim construction, only calculations that are necessary to complete the assignment must be performed before any calls are made. As long as that requirement is met, the claims do not preclude any additional calculations during the telephone call.

According to Adept, three dependent claims not asserted in the case should compel a different claim construction. In these claims – 28, 40, and 52 of the '111 patent – the originating telephone number is that of a "non-stationary telephone, such as a mobile, cellular or transportable telephone." Adept contends that these mobile telephone claims require some sort of spatial calculation at the time of the call to determine the correct service location based on the caller's physical location and therefore would be impossible to practice under a claim construction such as the one we adopt.

We are not persuaded. As discussed, the plain language of the independent claims requires each potential caller to be assigned a service location telephone number before any call is placed. Since the mobile telephone claims depend from the independent claims, all potential mobile telephone callers must also be assigned a service location before a call is placed. Nothing in the language of the claims

indicates otherwise. While the claims and the written description appear to contemplate that the assignment will be based on the caller's physical location at the time of the call, the written description does not teach a method for doing so. Significantly, the patents do not disclose the use of stored algorithms that could be used to assign service location telephone numbers during a call from either a mobile telephone or a fixed landline, and thus the written description does not support Adept's proposed construction.

Furthermore, it is not clear that the mobile telephone claims would be impossible to practice under the correct claim construction. Prior to any calls, a service location could be assigned to a mobile telephone based on, for example, a physical location associated with its NPA-NXX. Be that as it may, we need not resolve this question. Even if the mobile telephone claims are rendered inoperative by a proper claim construction, preserving the validity of unasserted claims is an insufficient reason to ignore the meaning of the claims actually asserted in the case. *See Intamin Ltd. v. Magnetar Techs. Corp.*, 483 F.3d 1328, 1337 (Fed. Cir. 2007).

In sum, based on consideration of the claims, the written description, and the remainder of the intrinsic evidence, we conclude that the trial court was correct in the first instance when it construed the "assigning" language to refer to "a designation made prior to the telephone call of the first parties." We must also recognize, however, what the assignment entails – the telephone number of a service location is

assigned to the physical location or telephone number of each potential caller. As noted, this assignment must be made before any calls are placed. Thus, to the extent any calculations are needed to complete the assignment of service location telephone numbers to potential callers, they must be performed prior to any calls.

The trial judge modified the original claim construction by adding that the Neville patents "do not exclude calculations made during the telephone call." That statement is imprecise in the context in which it was presented, i.e., as part of the construction of the term "assigning," and allowed Adept to argue before the jury that calculations for completing the assigning step could be performed while a caller is on-line, an argument that is not consistent with the patented invention. Under the correct claim construction, assignment of service location telephone numbers to potential callers must occur prior to any calls, and thus any calculations necessary for completing that assignment must be performed before any telephone calls are placed.

B. Infringement

With the trial court's modified claim construction before them, the jury found that defendant Targus infringed the Neville patents, and the trial court subsequently denied a motion by Targus to grant, contrary to the jury's verdict, judgment as a matter of law in Targus's favor. The question before us is

whether the trial judge erred in denying the motion. We review the trial court's denial of Targus's motion for judgment as a matter of law under the law of the regional circuit. *z4 Techs., Inc. v. Microsoft Corp.*, 507 F.3d 1340, 1346 (Fed. Cir. 2007). Under Eleventh Circuit law, we review the denial of a motion for judgment as a matter of law without deference, reapplying the same standard applied by the trial court. *Christopher v. Florida*, 449 F.3d 1360, 1364 (11th Cir. 2006). Judgment as a matter of law is appropriate when there is no legally sufficient evidentiary basis for a reasonable jury to find in favor of the nonmoving party. *Id.* When a patent infringement verdict is based on an incorrect claim construction, we reverse the trial court's denial of a motion for judgment as a matter of law if no reasonable jury could have found infringement under the proper claim construction. *Finisar Corp. v. DirecTV Group, Inc.*, 523 F.3d 1323, 1333 (Fed. Cir. 2008).

In the Targus system, the telephone numbers and locations of potential callers are maintained in a database. The system also includes a database for each system customer containing the telephone numbers of the customer's service locations along with their corresponding service areas. Those service areas are configured by the customer before any calls are placed and may be radius-based (a circle around the service location) or defined by polygonal regions around each service location. While the Targus system contains information relating to both potential callers and customer service locations, it does not

match a customer service location to a particular caller prior to any calls taking place. Instead, as described in the IntelliRouting Express User Guide, callers are assigned to a service location "on the fly" with each telephone call.

When a call comes into the platform, the Targus system determines the caller's approximate latitude and longitude based on the caller's ANI. The system then computes a rectangular area, referred to as a window key, around that latitude/longitude. Next the system identifies a list of candidate service locations whose service areas overlap the window key. For each candidate, the system performs a detailed spatial calculation, either a distance computation or "point-in-polygon" calculation, to determine whether the caller's location is within the service area. This results in a list of one or more service locations to which the call may be routed.

Thus the accused Targus services do not assign service location telephone numbers to potential callers before calls are placed. Because all calculations necessary to complete the assignment are performed in real-time while the caller is on the line, the Targus services do not satisfy the "assigning" limitations in the Neville claims. Under the correct claim construction, no reasonable jury could find that Targus infringes the asserted claims of Adept's patents. Accordingly, we reverse the trial court's denial of Targus's motion for judgment of non-infringement as a matter of law. In light of that result, we vacate the infringement damages award and the permanent

injunction; we also vacate the trial court's judgment with respect to willfulness and attorney fees.

II. Targus Patents

A. Unasserted Claims

The jury found that all claims of the '897 patent and '131 patent were invalid, and the trial court entered judgment accordingly. Targus argues that the trial court erred because only claim 69 of the '897 patent and claims 1 and 50 of the '131 patent were asserted and at issue. Adept responds that all claims of the two patents were placed in issue by the declaratory judgment count in its complaint. If the evidence at trial proved that all the claims were invalid, Adept maintains, the trial judge properly entered judgment on the jury verdict.

We agree with Targus that the unasserted claims were not at issue, and thus the trial court erred. First, the scope of Adept's complaint is less than clear. Adept requested a declaratory judgment with respect to the invalidity of Targus's "asserted claims," an apparent reference to Targus's assertions of infringement against Adept and its customers prior to the filing of the lawsuit. (First Am. Compl. ¶¶ 57-58.) The complaint does not specify which claims fall into that category. In any event, a reference in the complaint is not sufficient to support a judgment that particular claims are invalid; the specific validity of those claims must have been at issue during the trial and actually

litigated by the parties. *Datascope Corp. v. SMEC, Inc.*, 776 F.2d 320, 327 (Fed. Cir. 1985).

Second, the parties' Joint Final Pretrial Statement demonstrates that only claim 69 of the '897 patent and claims 1 and 50 of the '131 patent were at issue during the trial. In that document, the parties stipulated that the asserted claims of the '897 patent and '131 patent were claim 69 and claims 1 and 50, respectively. (Joint Final Pretrial Statement 31.) Then, under the heading "Concise Statement of Issues of Fact and Issues of Law Which Remain for Determination by the Trial Court," the parties included the following two questions: "Are the asserted claims of the Shaffer-Moore patents valid?" and "Are the asserted Shaffer-Moore patents infringed, literally or under the doctrine of equivalents?" (*Id.* at 32-22.) There were no references whatsoever to the unasserted claims of the '897 patent and '131 patent.

Third, at trial, neither party presented evidence with respect to the unasserted claims. Adept's expert, Dr. Brody, expressly limited his validity analysis and opinions to claim 69 of the '897 patent and claims 1 and 50 of the '131 patent. (Trial Tr. 148-49, 184-85, 198-200, 208-10, 213, Oct. 16, 2006.) This is true with respect to both Adept's anticipation and obviousness contentions and its argument that the claims of the '131 patent were invalid due to an on-sale bar. Adept's argument that it was unnecessary for its validity expert to put forth a claim-by-claim analysis of the unasserted claims is simply incorrect. Under the patent statute, the validity of each claim must be

considered separately. *See* 35 U.S.C. § 282 ("Each claim of a patent (whether in independent, dependent, or multiple dependent form) shall be presumed valid independently of the validity of other claims. . . . "); *Schumer v. Lab. Computer Sys., Inc.*, 308 F.3d 1304, 1316 (Fed. Cir. 2002); *Sandt Tech., Ltd. v. Resco Metal & Plastics Corp.*, 264 F.3d 1344, 1356 (Fed. Cir. 2001).

In this case, it is clear from the parties' pretrial statement and from the trial proceedings that the unasserted claims were neither litigated nor placed in issue during the trial. We therefore reverse the trial court's judgment of invalidity with respect to the unasserted claims, i.e., all the claims of the '897 patent except claim 69 and all the claims of the '131 patent except claims 1 and 50.[9]

B. Asserted Claims

The jury also found all twelve of the asserted claims in the Moore-Shaffer patents invalid. Targus chose not to appeal the trial court's denial of its motion for judgment as a matter of law that the asserted claims are not invalid, and thus does not challenge on appeal the sufficiency of the evidence in support of the jury's verdict. Instead, Targus appeals only the trial court's denial of its motion for a new

[9] In light of this conclusion, we need not address Targus's additional argument that the trial court lacked jurisdiction to adjudicate the validity of the unasserted claims because there was no case or controversy with respect to those claims.

trial on the validity of these claims. Applying Eleventh Circuit law, we review the trial court's denial of a motion for a new trial for abuse of discretion. *Hicks v. Talbott Recovery Sys., Inc.*, 196 F.3d 1226, 1242 (11th Cir. 1999). When a jury verdict is judged to be against the great weight of the evidence, the trial judge has authority to grant a motion for a new trial. *Id.*; Charles Alan Wright, Arthur R. Miller & Mary Kay Kane, *Federal Practice and Procedure* § 2806 (2d ed. 1995).

Targus argues on appeal that the jury's invalidity findings were "tainted" by the erroneous characterization of the Neville patents by Adept's expert, Dr. Brody. In particular, Targus complains that Dr. Brody repeatedly asserted that the Neville patents teach real-time spatial calculations of the sort used by Targus and claimed in some of the Moore-Shaffer patents. Because Dr. Brody testified that the asserted claims were either anticipated by the Neville patents or rendered obvious by the combination of the Neville patents and other prior art, Targus believes it is entitled to a new trial on the validity of the asserted claims.

We agree with Targus, but only in part. Targus requests on appeal a new trial on "whether the asserted claims of the Moore-Shaffer patents that concern 'on line calculations' are invalid." (Appellant's Reply Br. 22-23.) In its brief, Targus identifies only two asserted claims that involve on-line or real-time calculations – claim 46 of the '868 patent and claim 10 of the '810 patent. (Appellant's Br. 49-50.) Our

review of the record confirms that those are the only asserted claims directed to Targus's real-time system. Our review further confirms that Dr. Brody's testimony with regard to the alleged real-time aspect of the Neville patents was directed to the validity of only those two claims and not to the other asserted claims.

As explained above in the discussion on the Adept patents, Dr. Brody's characterization of the scope of the Neville patent disclosure was mistaken. Furthermore, the primary if not the entire evidence on which the jury could have relied in finding claim 46 of the '868 patent and claim 10 of the '810 patent invalid was Dr. Brody's erroneous testimony. Under these circumstances, the trial judge should have granted the motion for a new trial with regard to these two claims because the great weight of the evidence in the record was against the jury's verdict. This does not preclude the possibility that other evidence produced at a retrial would be sufficient to establish invalidity.

The failure to have granted Targus's motion was an abuse of discretion; accordingly, we vacate the trial court's judgment that claim 46 of the '868 patent and claim 10 of the '810 patent are invalid, and remand for a new trial on their validity. We affirm the trial court's judgment that the remaining asserted claims of the Moore-Shaffer patents are invalid.

III. Tortious Interference

In its suit against Targus, Adept claimed that, because Targus had asserted certain of its patent claims against some of Adept's customers, Targus had tortiously interfered with Adept's business relationships with those customers. This, according to Adept, entitled Adept to the state-law remedy available for such an unfair trade practice. Targus responded that the state-law remedy is preempted by the federal patent laws. The "preemption" issue can be stated thus: if a patentee attempts to enforce its patents against a competitor's customers, under what circumstances, if any, is the patentee protected from the usual standards regarding unfair trade practices, imposed by various state unfair competition laws, on the theory that the rights accorded a patentee to enforce the patent supersede the usual anti-competition rules? *See Zenith Elecs. Corp. v. Exzec, Inc.*, 182 F.3d 1340, 1345-46 (Fed. Cir. 1999).

The answer to the question is now well-established. State tort claims against a patent holder, including tortious interference claims, based on enforcing a patent in the marketplace, are "pre-empted" by federal patent laws, unless the claimant can show that the patent holder acted in "bad faith" in the publication or enforcement of its patent. *Id.* at 1355; *Hunter Douglas, Inc. v. Harmonic Design, Inc.*, 153 F.3d 1318, 1336-37 (Fed. Cir. 1998). As the Supreme Court said long ago, "Patents would be of little value if infringers of them could not be notified of the consequences of infringement, or proceeded against in

the courts. Such action, considered by itself, cannot be said to be illegal." *Virtue v. Creamery Package Mfg. Co.*, 227 U.S. 8, 37-38 (1913).

The issue in this case is whether Adept presented to the jury sufficient facts, if believed, that a reasonable jury could find for Adept on the issue of Targus's bad faith. This "bad faith" standard has objective and subjective components. *Dominant Semiconductors Sdn. Bhd. v. Osram GmbH*, 524 F.3d 1254, 1260 (Fed. Cir. 2008). The objective component requires a showing that the infringement allegations are "objectively baseless." *Globetrotter Software, Inc. v. Elan Computer Group, Inc.*, 362 F.3d 1367, 1375 (Fed. Cir. 2004). The subjective component relates to a showing that the patentee in enforcing the patent demonstrated subjective bad faith. *See id.* Absent a showing that the infringement allegations are objectively baseless, it is unnecessary to reach the question of the patentee's intent. *See id.*

Infringement allegations are objectively baseless if "no reasonable litigant could realistically expect success on the merits." *Prof'l Real Estate Investors, Inc. v. Columbia Pictures Indus., Inc.*, 508 U.S. 49, 60 (1993); *see also GP Indus., Inc. v. Eran Indus., Inc.*, 500 F.3d 1369, 1374 (Fed. Cir. 2007); *Globetrotter*, 362 F.3d at 1375-76. To prove at trial that Targus's actions were objectively baseless, Adept was required to offer clear and convincing evidence that Targus had no reasonable basis to believe that its patent claims were valid or that they were infringed by Adept's customers. *See Golan v. Pingel Enter., Inc.*, 310 F.3d

1360, 1371 (Fed. Cir. 2002). Because of the value placed on property rights, which issued patents share, *see* 35 U.S.C. § 261 ("[P]atents shall have the attributes of personal property."); *Consol. Fruit-Jar Co. v. Wright*, 94 U.S. 92, 96 (1876) ("A patent for an invention is as much property as a patent for land."); *Kearns v. Gen. Motors Corp.*, 94 F.3d 1553, 1555 (Fed. Cir. 1996) ("By statutory and common law, each patent establishes an independent and distinct property right."), and in light of the underlying jurisprudential basis for the bad faith standard, rooted as it is in Supreme Court cases and Constitutional principles, *see Globetrotter*, 362 F.3d at 1375-77, a party attempting to prove bad faith on the part of a patentee enforcing its patent rights has a heavy burden to carry.

The jury verdict was that Adept had proved its case. Targus appeals the trial court's denial of its motion for judgment as a matter of law, arguing that there was no clear and convincing evidence on which a reasonable jury could conclude its actions were objectively baseless. On the record before us, for the reasons we shall explain, we believe Targus is correct that Adept has not successfully carried its burden.

We first address the question of whether Targus could have had a reasonable belief that its patents were valid, beginning with the '897 patent. The main dispute regarding the validity of the '897 patent was whether Neville discloses a two-table embodiment, which would anticipate the claims of the '897 patent. While the preferred embodiment in Neville uses a

single-table TNTTN database, one sentence in the written description states that "the correlational database may be relational or hierarchical," which implies that the database could have more than one table. '111 patent col.9 ll.50-51. The issue before us is not the validity *vel non* of the '897 patent, but whether the evidence was such that Targus could not have had a reasonable basis for believing that the patent was valid when it asserted the patent against Adept's customers.

Adept alleges that Targus knew the disclosure in the Neville patents anticipated the claims of the '897 patent, and that Targus misrepresented the scope of Neville to the PTO so that the '897 patent claims would survive the reexamination requested by Adept in 1999. Adept's argument sounds more like an allegation of subjective bad faith on Targus's part, a question that is not at issue absent the predicate showing that the claims asserted by Targus were objectively baseless. Furthermore, none of the evidence cited in Adept's brief supports its theory that Targus acted deceptively. The evidence introduced at trial shows that many people, including the examiner who conducted the reexamination and even Adept's own patent attorney, understood Neville to disclose only a one-table system. Notably, Targus did not file suit against any of Adept's customers until after reexamination of the '897 patent had been completed. On this record, a reasonable jury could not have found by clear and convincing evidence that Targus

lacked a reasonable basis to believe that the claims of the '897 patent were not anticipated by Neville.

Adept also asserts that Targus knew that Neville anticipated Targus's one-table claims – claim 1 of the '608 patent and claim 4 of the '982 patent. Targus argues that it reasonably believed Neville did not disclose the automated table-build process required by the Targus claims. This was a reasonable view, as evidenced by the opinion of Targus's expert at trial that Neville does not teach a fully automated system. The contrasting opinion of Adept's expert does not render Targus's position unreasonable. As with the '897 patent, we conclude that no reasonable jury could have found that Adept met its burden to show that there was no reasonable basis on which Targus could believe in the validity of its one-table claims.

Regarding the '131 patent, Adept argues that Targus knew it was subject to an on-sale bar based on work that Targus did for Federal Express, and that Targus actively concealed that information from the PTO. The record indicates, however, that Targus reasonably believed that that work was experimental, even if ultimately the jury in this case may have found otherwise. Furthermore, during prosecution of the application that led to the '131 patent, Targus submitted a declaration to the PTO detailing the development and testing of the FedEx system. Under these circumstances, no reasonable jury could find that Adept proved by clear and convincing evidence that Targus lacked a reasonable basis for believing

that the claims of the '131 patent were not subject to the on-sale bar.

With respect to Targus's other patents, Adept alleges that the examiner was led astray so that he failed to consider Neville in combination with Riskin or other references, even though Neville and Riskin and multiple other references were before him. Yet Adept cites no evidence demonstrating that Targus knew its claims were invalid for obviousness or showing that Targus somehow caused the examiner not to combine prior art references. On this record, no reasonable jury could have found that a belief by Targus that its patents were valid had no reasonable basis.

We must also consider whether there was a basis for Targus to reasonably believe that Adept's customers infringed the Targus patents. Adept essentially argues that Targus could not have had a reasonable basis for asserting its patents against Adept's customers because Targus did not succeed at trial on its infringement claims against Adept. Courts, however, "must 'resist the temptation to engage in *post hoc* reasoning by concluding' that an ultimately unsuccessful 'action must have been unreasonable or without foundation.'" *Prof'l Real Estate*, 508 U.S. at 60 n.5 (quoting *Christiansburg Garment Co. v. EEOC*, 434 U.S. 412, 421-22 (1978)); *see also Dominant*, 524 F.3d at 1261 & n.6 (citing *Prof'l Real Estate*, 508 U.S. at 60 n.5). Thus the result of Targus's infringement claims in this case is not dispositive of whether

Targus's claims against Adept's customers were reasonable.

Targus presented evidence that it reasonably believed Adept's customers were infringing the Targus patents. For instance, Adept admitted that the database it provided to two of its customers was in the same format as the database used in the Targus system. Also, Targus did not assert its claims against another Adept customer until after Targus's in-house counsel had prepared claim charts explaining Targus's infringement theories. Adept has not cited any contradictory evidence that was introduced at trial. On this record, no reasonable jury could find by clear and convincing evidence that Targus had no reasonable basis for believing that Adept's customers were infringing its patents.

Adept's tortious interference claim with respect to its customer Allstate Motor Club ("AMC") was based on Targus's infringement claim against its own customer, Vail Systems. In providing routing services to AMC, Vail used data received from AMC, which included a database that Allstate had received from Adept. After learning about this arrangement through discovery in this case, Targus believed that Vail infringed its patents and filed claims against Vail, which subsequently sought indemnification from AMC. While Adept alleges that Targus and Vail colluded to pressure AMC, Adept fails to cite evidence showing that Targus's belief that Vail infringed its patents was unreasonable. As with Targus's infringement allegations against Adept's customers, no

reasonable jury could find that Adept met its burden to show that Targus lacked a reasonable basis for believing that Vail infringed its patents.

In sum, we conclude that there is not clear and convincing evidence on which a reasonable jury could find that Targus acted in bad faith by asserting objectively baseless patent infringement allegations. Thus Adept's state-law tortious interference claim is preempted by federal patent law. The trial judge erred in denying Targus's motion for judgment as a matter of law on this claim, and we therefore reverse the trial court's judgment.

CONCLUSION

We reverse the trial court's judgment of infringement of the Neville patents. Accordingly, we vacate the infringement damages award and the permanent injunction; we also vacate the trial court's judgment with respect to willfulness and attorney fees.

We reverse the trial court's judgment of invalidity with respect to the unasserted claims of the '897 patent and '131 patent. We vacate the trial court's judgment that claim 46 of the '868 patent and claim 10 of the '810 patent are invalid and remand for a new trial on the validity of those claims. We affirm the invalidity judgment with respect to the remaining patent claims asserted by Targus against Adept.

We reverse the trial court's judgment on Adept's tortious interference claim and vacate the accompanying award of compensatory and punitive damages.

AFFIRMED-IN-PART, REVERSED-IN-PART, VACATED-IN-PART, and REMANDED

DYK, Circuit Judge, concurs in the result.

UNITED STATES DISTRICT COURT
MIDDLE DISTRICT OF FLORIDA
ORLANDO DIVISION

800 ADEPT, INC.,

Plaintiff,

-vs-

MUREX SECURITIES, LTD., MUREX LICENSING CORPORATION, TARGUS INFORMATION CORPORATION, and WEST CORPORATION,

Defendants.

MUREX SECURITIES, LTD., MUREX LICENSING CORPORATION, TARGUS INFORMATION CORPORATION, and WEST CORPORATION,

Counter-Plaintiffs

-vs-

800 Adept, Inc.,

Counter-Defendant.

Case No. 6:02-cv-1354-Orl-28DAB

MUREX SECURITIES, LTD., and MUREX LICENSING CORPORATION,

Third-Party Plaintiffs,

-vs-

Adeptel, Inc.,

Third-Party Defendant.

ORDER

(Filed Aug. 3, 2006)

This case comes before the Court on the following:

1. *Markman* Motion of Targus Information Corporation, Murex Securities, Ltd., Murex Licensing Corporation, and West Corporation (collectively "Defendants") (Doc. No. 240, filed May 19, 2006);

2. Opposition To Defendant's *Markman* Motion of Plaintiff 800 Adept, Inc. (Doc. No. 268, filed June 19, 2006);

3. Combined Motion And Memorandum To Strike 800 Adept's *Markman* Opposition As Untimely Or, Alternatively, For Leave To Reply of Defendants (Doc. No. 291, filed July 3, 2006); and

4. Opposition To Combined Motion To Strike *Markman* Opposition And Motion For Leave To Reply of Plaintiff 800 Adept, Inc. (Doc. No. 303, filed July 17, 2006).

In this patent infringement lawsuit, Targus Information Corporation, Murex Securities, Ltd., Murex Licensing Corporation, and West Corporation (collectively "Defendants") ask the Court to interpret several terms from the claims of U.S. Patent Numbers RE36,111 ("the '111 Reissue") and 5,805,689 ("the '689 Patent") and one term from the claims of the

Shaffer-Moore Patents that are identified in the margin.[1] (Doc. No. 240).

First, Defendants move the Court to Strike the Opposition of Plaintiff 800 Adept, Inc. (hereinafter, "800 Adept") because 800 Adept did not file a *Markman* Motion seeking to construe the claims of the '111 Reissue and '689 Patent and because 800 Adept raised new arguments in its Opposition regarding the proper construction of Defendant's disputed claim terms. (Doc. No. 291). Defendant's Motion to Strike and the issued raised therein are without merit, as an opposition to a motion is expressly allowed by the Court's Amended Case Management and Scheduling Order. (Doc. No. 182, Part II.E, p. 5). Moreover, a reply is not necessary for the arguments raised by 800 Adept in its Opposition.

Secondly, Plaintiff's argument that this motion is barred by the law of the case doctrine is not well-founded. (See Doc. No. 268, p. 15). The law of the case doctrine applies to only those issues discussed and decided by previous decisions and those issues decided in such decisions by necessary implication. *Toro*

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[1] The Shaffer-Moore Patents, as identified in the Declaration of Michael M. Barry, are U.S. Patent Numbers 5,506,897 ("the '897 Patent"), 5,848,131 ("the '131 Patent"), 5,901,214 ("the '214 Patent"), 5,907,608 ("the '608 Patent"), 5,910,982 ("the '982 Patent"), 5,956,397 ("the '397 Patent"), 5,982,868 ("the '868 Patent"), 6,058,179 ("the '179 Patent"), and 6,091,810 ("the '810 Patent"). (*See* Doc. No. 241, Ex. FF; Doc. No. 31, pp. 12-13). The claims of the '868 Patent do not recite the disputed claim term.

Co. v. White Consol. Indus., Inc., 383 F.3d 1326, 1335 (Fed. Cir. 2004). Defendants now seek a judicial determination of the meaning of a claim term, "assigning," which is a separate and distinct claim term from the one that was previously construed, "directly routing." The Court must "must give each claim term the respect that it is due," *Pause Tech., LLC v. TiVo, Inc.*, 419 F.3d 1326, 1334 (Fed. Cir. 2005), or, in other words, the Court should endeavor to give meaning to all the terms of a claim. *Merck & Co. v. Teva Pharms. USA, Inc.*, 395 F.3d 1364, 1372 (Fed. Cir. 2005).

Moreover, the issues raised in Defendants' motion were not necessarily decided by implication in the District Court's previous *Markman* Order. In that Order, the Court addressed whether the claim term "direct routing" prohibited caller input. (Doc. No. 178, p. 38). Further, the Court's determination that the preambles of claim 41 of the '111 Reissue and claim 1 of the '689 Patent did not contain a "direct routing" limitation did not decide, either expressly or impliedly, whether those claims assigned callers prior to the placement of a telephone call.

In addition, the Magistrate Judge and previous District Court Judge declined to address the litigants' arguments concerning the "assigning" limitation and instead considered the merits of the "direct routing" limitation. (*See* Doc. No. 252, p. 19; Doc. No. 178, p. 34). Where previous decisions decline to consider an issue, the law of the case doctrine does not operate to bar the future consideration of such issue. *Laitram Corp. v. NEC Corp.*, 115 F.3d 947, 952-53 (Fed. Cir.

1997) (applying the precedent of the Court of Appeals for the Eleventh Circuit).

The Court now turns to the task of construing the claims.

Claim Construction

Patent claims are construed by the Court as a matter of law. *Cybor Corp. v. FAS Techs., Inc.*, 138 F.3d 1448, 1454-56 (Fed. Cir. 1998) (en banc). "[T]he words of a claim 'are generally given their ordinary and customary meaning.'" *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc) (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)). Such ordinary meaning "is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention." *Id.* at 1313.

To determine the ordinary meaning of a term, the court should review "the same resources as would" the person of ordinary skill in the art. *Multiform Dessicants, Inc. v. Medzam, Ltd.*, 133 F.3d 1473, 1477 (Fed. Cir. 1998). Those resources include "the words of the claims themselves, the remainder of the specification, the prosecution history, and extrinsic evidence concerning relevant scientific principles, the meaning of technical terms, and the state of the art." *Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1116 (Fed. Cir. 2004).

"[T]he claims themselves provide substantial guidance as to the meaning of particular claim terms." *Phillips,* 415 F.3d at 1314. Both "the context in which a term is used in the asserted claim" and the "[o]ther claims of the patent in question" are useful for understanding the ordinary meaning. *Id.*

"[T]he specification 'is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term.'" *Id.* at 1315 (quoting *Vitronics,* 90 F.3d at 1582). In short, the claims "must be read in view of the specification, of which they are a part." *Markman v. Westview Instruments, Inc.,* 52 F.3d 967, 979 (Fed. Cir. 1995) (en banc). Thus, "[t]he construction that stays true to the claim language and most naturally aligns with the patent's description of the invention will be, in the end, the correct construction." *Renishaw PLC v. Marposs Societa' per Azioni,* 158 F.3d 1243, 1250 (Fed. Cir. 1998); *see also On Demand Mach. Corp. v. Ingram Indus., Inc.,* 442 F.3d 1331, 1344 (Fed. Cir. 2006) ("[E]ach term must be construed to implement the invention described in the specification").

Occasionally, "the specification may reveal a special definition given to a claim term . . . that differs from the meaning it would otherwise possess. In such cases, the inventor's lexicography governs." *Phillips,* 415 F.3d at 1316 (citing *CCS Fitness, Inc. v. Brunswick Corp.,* 288 F.3d 1359, 1366 (Fed. Cir. 2002)). The specification may also "reveal an intentional disclaimer, or disavowal, of claim scope by the

inventor . . . [, which] is regarded as dispositive." *Id.* (citing *SciMed Life Sys., Inc. v. Advanced Cardiovascular Sys., Inc.*, 242 F.3d 1337, 1343-44 (Fed. Cir. 2001)).

In addition to consulting the specification, courts "should also consider the patent's prosecution history, if it is in evidence." *Id.* at 1317 (internal quotation marks and citation omitted). Because the prosecution history represents negotiation between the United States Patent and Trademark Office (the "Patent Office") and the applicant, "it often lacks the clarity of the specification and thus is less useful for claim construction purposes." *Id.* Nevertheless, the prosecution history can be helpful "by demonstrating how the inventor understood the invention and whether the inventor limited the invention in the course of prosecution." *Id.*

The court may also rely on extrinsic evidence, which is "all evidence external to the patent and prosecution history, including expert and inventor testimony, dictionaries, and learned treatises." *Markman*, 52 F.3d at 980. Although extrinsic evidence can be useful, it is "less significant than the intrinsic record in determining 'the legally operative meaning of claim language.'" *Phillips*, 415 F.3d at 1317 (quoting *C.R. Bard, Inc. v. U.S. Surgical Corp.*, 388 F.3d 858, 862 (Fed. Cir. 2004)). Technical dictionaries and treatises can inform the Court's understanding of the underlying technology and the manner in which one skilled in the art might use claim terms, but technical dictionaries and treatises

may provide definitions that are too broad or may not be indicative of how the term is used in the patent. *Id.* at 1318. Similarly, expert testimony can aid a court in understanding the underlying technology and determining the particular meaning of a term in the pertinent field, but an expert's conclusory, unsupported assertions as to a term's definition is not unhelpful. *Id.* Generally, extrinsic evidence is "less reliable than the patent and its prosecution history in determining how to read claim terms." *Id.*

During claim construction, "[t]he sequence of steps used by the judge in consulting various sources is not important; what matters is for the court to attach the appropriate weight to be assigned to those sources in light of the statutes and policies that inform patent law." *Phillips*, 415 F.3d at 1324.

In addition, the '111 Reissue and the '689 Patent contain means-plus-function limitations that require construction. Such limitations are subject to Title 35 U.S.C. § 112, ¶ 6. *Braun Med., Inc. v. Abbott Labs.*, 124 F.3d 1419, 1424 (Fed. Cir. 1997). In relevant part, Section 112, ¶ 6 mandates that "such a claim limitation 'be construed to cover the corresponding structure . . . described in the specification and equivalents thereof.'" *Id.* Accordingly, when faced with means-plus-function limitations, courts "must turn to the written description of the patent to find the structure that corresponds to the means recited in the [limitations]." *Id.*

Construing a means-plus-function limitation involves multiple steps. "The first step in construing [a means-plus-function] limitation is a determination of the function of the means-plus-function limitation." *Medtronic, Inc. v. Advanced Cardiovascular Sys., Inc.*, 248 F.3d 1303, 1311 (Fed. Cir. 2001). Once the Court has determined the limitation's function, "the next step is to determine the corresponding structure disclosed in the specification and equivalents thereof." *Id.* A "structure disclosed in the specification is 'corresponding' structure only if the specification or prosecution history clearly links or associates that structure to the function recited in the claim." *Id.* Moreover, the focus of the "corresponding structure" inquiry is not merely whether a structure is capable of performing the recited function, but rather whether the corresponding structure is "clearly linked or associated with the [recited] function." *Id.*

The '111 Reissue and '689 Patent Claims

Defendants contend that each of theses patents contains claims having the following limitation:

> assigning to . . . said potential first parties a telephone number of a service location of a second party.

(Doc. No. 240, p. 1). Defendants aver that this limitation of the '111 Reissue and the '689 Patent "require[s] that all potential first parties be assigned to a telephone number of a service location of a second party by defining the boundaries of various service

location trade areas." (*Id.* at 4, quotations and modifications omitted). Consequently, Defendants conclude that the claims require that each and every potential caller be assigned to a service location *before* any call is made, and therefore any system that uses calculations to select a service location *after* a call is made is excluded from the claimed invention. (*Id.* at 5). 800 Adept argues in response that Defendants improperly construe the claims without reference to the specific claim language. (Doc. No. 268, p. 2).

The Court first identifies the language of each claim the parties wish to construe. The '111 Reissue contains five independent claims that contain similar assigning claim limitations or method steps. Claims 1, 9, 17, 29 and 41, as amended by the reissue patent, are set forth below.

> 1. A system for direct routing a telephone call from a first party who has an originating telephone number at a specific location defined by latitude and longitude coordinates who dials a telephone number including digits uniquely characteristic to a second party having a plurality of service locations, said system comprising:
>
> means for allocating individual latitude and longitude coordinates to each originating telephone number of all potential first parties;
>
> means for defining the boundaries of one or more geographical areas which can be of any size and shape according to

predetermined criteria, each point along said boundaries being defined by latitude and longitude coordinates;

means for *assigning to each originating telephone number of said potential first parties a telephone number of a service location of a second party that will receive calls originating from within the boundary of a geographic area defined by said means for defining in which the individual latitude and longitude coordinates of the specific location of each of said potential first parties lie;*

means for determining the originating telephone number of the first party from which said telephone call is to be routed; and

direct routing means for direct routing said telephone call to a service location of the second party assigned to said originating telephone number of the first party by said means for assigning.

9. A method for direct routing a telephone call from a first party who has an originating telephone number at a specific location defined by latitude and longitude coordinates who dials a telephone number including digits uniquely characteristic to a second party having a plurality of service locations, said method comprising the steps of:

allocating individual latitude and longitude coordinates to each originating telephone number of all potential first parties;

defining the boundaries of one or more geographical areas which can be of any size and shape according to predetermined criteria, each point along said boundaries being defined by latitude and longitude coordinates;

assigning to each originating telephone number of said potential first parties [a telephone number] of a service [ ] location of a second party that [will[2]*] receive calls originating from within the boundary of a geographic area defined in said step of defining in which the individual latitude and longitude coordinates of the specific*

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[2] Claim 9 of the '111 Reissue contains three printing errors. The claim recites the word "parties" in between "service location" and omits the terms "a telephone number" and "will." The published claim differs from the claim language recited in the claims allowed by the Patent Office and submitted by the applicant. (*See* Doc. No. 240, Ex. C, p. 235). The record does not contain any evidence that a certificate of correction has issued for this patent. The Court finds that these are clear clerical errors due to oversight that are not subject to reasonable debate and construes the claim as if it were properly published. *Novo Indus., L.P. v. Micro Molds Corp.*, 350 F.3d 1348, 1354 (Fed. Cir. 2003) (quoting *I.T.S. Rubber Co. v. Essex Rubber Co.*, 272 U.S. 429 (1926)). The claim language in this Order incorporates the changes of the Reissue.

location of each of said potential first parties lie;

determining the originating telephone number of the first party from which said telephone call is to be routed; and

directly routing said telephone call to a service location of the second party assigned to said originating telephone number of the first party by said step of assigning.

17. A system for direct routing a telephone call from a first party who has an originating telephone number at a physical location and who dials a telephone number including digits uniquely characteristic to a second party having a plurality of service locations, said system comprising:

means for allocating latitude and longitude coordinates to the physical location of all potential first parties;

means for defining the boundaries of one or more geographical areas which can be of any size and shape according to predetermined criteria, each point along said boundaries being defined by latitude and longitude coordinates;

means for *assigning to the physical location of said potential first parties a telephone number of a service location of a second party that will*

receive calls originating from within the boundary of a geographic area in which the latitude and longitude coordinates of the physical location of each of said potential first parties lie;

means for determining the originating telephone number of the first party from which said telephone call is to be routed; and

direct routing means for directly routing said telephone call to a service location of the second party assigned to said originating telephone number of the first party by said means for assigning.

29. A method for direct routing a telephone call from a first party who has an originating telephone number at a physical location and who dials a telephone number including digits uniquely characteristic to a second party having a plurality of service locations, said method comprising the steps of:

allocating latitude and longitude coordinates to the physical location of all potential first parties;

defining the boundaries of one or more geographical areas which can be of any size and shape according to predetermined criteria, each point along said boundaries being defined

by latitude and longitude coordinates;

assigning to the physical location of said potential first parties a telephone number of a service location of a second party that will receive calls originating from within the boundary of a geographic area in which the latitude and longitude coordinates of the physical location of each of said potential first parties lie;

determining the originating telephone number of the first party from which said telephone call is to be routed; and

directly routing said telephone call to a service location of the second party assigned to said originating telephone number of the first party by said step of assigning.

41. A method of constructing a database wherein said database is used by a telephone service provider for direct routing a telephone call from a first party who has an originating telephone number at a physical location and who dials one of an 800-type, 900-type or other special access code telephone number assigned to a second party, who has determined specific locations to receive calls originating from within predetermined geographic areas, thereby allowing the first party to reach one of a plurality of locations of the second party based on

geographic location from which the telephone call originate from within one of a plurality of geographic areas, said method comprising the steps of:

(a) assigning individual latitude and longitude coordinates to the physical location of all potential first parties;

(b) defining the boundaries of one or more geographic areas which can be of any size and shape according to predetermined criteria each point along said boundaries being defined by latitude and longitude coordinates; and

(c) *assigning to the physical location of said potential first parties a telephone number of a service location of a second party that will receive calls originating from within the boundary of a geographic territory in which the latitude and longitude coordinates of the physical location of each of said potential first parties lies.*

('111 Reissue, col. 13, ll. 2-30; col 13. l. 51 to col. 14, l. 11; col. 14., ll. 32-57; col. 15, ll. 19-44; col. 16, ll. 7-34, emphasis added). The '689 Patent issued with a single independent claim. Claim 1 recites:

1. In a telephone system, a method of constructing a database wherein said database is used by a telephone service provider for direct routing a telephone call from a first

party who dials one of an 800-type, 900-type or other special access code telephone number assigned to a second party, who has determined specific locations to receive calls originating from within pre-determined geographic areas, thereby allowing the first party to reach one of a plurality of locations of the second party based on geographic location of the first party from within one of a plurality of geographic areas, said method comprising the steps of:

a. assigning individual latitude and longitude coordinates to each telephone number of all potential first parties;

b. defining the boundaries of one or more geographic areas which can be of any size and shape according to pre-determined criteria;

c. *assigning to the telephone number of each potential first party a telephone number of a specific location of the second party that will receive calls originating from within a geographic area of each first party;*

d. determining in which geographic area a potential call might originate for each potential first party in the area encompassed by all geographic areas; and

e. assigning the specific location of the second party to all potential first

> parties within the boundaries of each geographic area.

('689 Patent, col. 12, l. 64 to col. 13, l. 23, emphasis added). The Court addresses the construction of claims 1 and 17 of the '111 Reissue separately below because each of these claims recites the assigning limitation in mean-plus-function format.

Both parties treat the underlined assigning steps in claims 9, 17, 29, and 41 of the '111 Reissue and claim 1 of the '689 Patent as substantially the same; the Court does not. Further, Defendants' truncation of the assigning step improperly omits claim terms. In each claim, the object of the gerund "assigning" is not "to . . . said first parties" but "to each originating telephone number of said potential first parties" or "to the physical location of said potential first parties" or "to the telephone number of each potential first party." Because the Court must "must give each claim term the respect that it is due," it would be inappropriate to ignore the underlined terms. *Pause Tech., LLC*, 419 F.3d at 1334.

Nevertheless, the claims are substantially similar in that they each call for an assignment, and each claim recites "potential first parties" or "potential first party." This Order addresses the latter claim limitations first. Then, the Court will construe the meaning of the "assigning" limitation.

"Potential First Parties"

Defendants argue that the term "first parties" should be understood as referring to a caller or a person who is making a telephone call. (Doc. No. 240, p. 4). Defendants also assert that the term "potential," which allegedly modifies the term "first parties" in every claim, means the "first parties" are not actual callers, i.e., a person who has made or is making a call, but rather a person who may make a telephone call. (*Id.*). 800 Adept contends that "potential first parties" should be construed as "those parties who can be assigned latitude and longitude coordinates and can also be assigned to a destination according to the second parties' criteria." (Doc. No. 268, p. 9).

Each of the independent claims of these two patents provides the context in which to construe "first parties." The preambles of claims 1, 9, 17, 29 and 41 of the '111 Reissue all recite "a telephone call from a first party who has an originating telephone number," and the preamble of claim 1 of the '689 Patent recites "a telephone call from a first party who dials one of an 800-type, 900-type or other special access code telephone number." This is not to say that the preambles act as a limitation of the claims, but such language places the claim term in a context that is absent from the rest of the claim. Thus, the claimed "first parties" are colloquially "callers" or "individuals who place telephone calls."

It is also clear from the specification that the term "first parties" must refer to callers. The written description describes "a system for automatic direct routing of telephone calls from customers" ('111 Reissue, col. 1, ll. 19-20) designed to reduce the amount of computer interaction by "causing the call to be direct-routed" (*id.* at col. 2, l. 7). It also states that a prior art patent "requires that the caller dial from a 'touch-tone' phone." (*Id.* at col 2, ll. 19-20). Under the heading "Summary of the Invention," the patent discloses that the "primary object of the present invention is to provide a reliable and cost-effective manner of directly connecting callers interested in an advertiser's product. . . ." (*Id.* at col. 3, ll. 10-12). The abstracts and specifications repeatedly and consistently refer to "calls" and "callers" but fail even once to use the term "first parties" except in the claims. (*See id. passim*). Put simply, the terms call and caller are used throughout both patent specifications, and "first parties" is not. (*See id.* at face page).

Defendants offer two definitions for "potential" from internet dictionaries which do not differ substantively from the definition found in the bound dictionaries available to the Court. (*See* Doc. No. 240, p. 4 n.6). Defendants' definitions are "existing in possibility" and "capable of development into actuality." (*See id.*). Plaintiffs do not offer any dictionary definition for the term. *Webster's II New Riverside University Dictionary* defines potential as "1. Capable of being but not yet in existence. 2. Denoting possibility, capability, or power." WEBSTER'S II NEW RIVERSIDE

UNIVERSITY DICTIONARY 920 (1994). The Court of Appeals for the Federal Circuit permits the use of general purpose dictionaries in cases that involve commonly understood words having widely accepted meanings. *Phillips,* 415 F.3d at 1314. Such is the case here.

The ordinary meaning of "potential" is also consistent with the use of the term in the specification. The term "potential" is found only within the abstract and claims of each patent. The abstracts are identical:

> A method and system for direct routing of telephone calls made by a caller originating from within specific calling areas to one of a plurality of locations of a second party according to certain criteria established by the second party. This routing is accomplished based on the assignment of latitude and longitude coordinates to *a potential caller's* location. Once these coordinates are assigned to each of *the potential callers,* the second party's criteria is applied to assign *the potential caller* to a second party. Such criteria could be existence within a previously-defined geographic area, a custom defined geographic area, or through calculations such as the shortest distance between coordinate points. Once all such assignments have been made, a database is assembled to be used by a long distance carrier for direct routing of telephone calls from callers to an assigned second party.

(*Id.* at face page, emphasis added). Such disclosure does not add much of substance other than indicating the term is used as one would expect, and that the written description of the patents does not "reveal a special definition . . . that differs from the meaning [that the term] would otherwise possess." *Phillips*, 415 F.3d at 1316.

Here, the adjective, "potential," modifies the meaning of the noun "parties" which has already been modified by the adjective "first." That is, the meaning of "potential first parties" is a specialized meaning of the broader term "first parties." As discussed above, the term "first parties" refers to a universe of callers or individuals who place telephone calls, and the adjective "potential" narrows that universe of individuals to those having the capability of placing a telephone call but who have not done so. Consequently, the Court construes the term "potential first parties" to mean "individuals who can place a telephone call but have not yet done so."

"Assigning"

Defendants contend that the term "assigning" means to specify, select, or designate or to "fix in correspondence or relationship." (Doc. No. 240, p. 4 n.8). Defendants argue that the patent abstracts and figures demonstrate further that such assignment must be accomplished before a caller places a telephone call and that such assignment must be stored in a single look-up table. (*Id.* at 5-8). Defendants also

identify portions of the prosecution history that allegedly show a disclaimer of spacial calculations made after a caller has placed a call and a disclaimer of database structures other than a single look-up table. (*Id.* at 8-15). In addition, Defendants contend that the Examiner's statements concerning the scope of the disclosure of the '111 Reissue in an unrelated reexamination proceeding supports the conclusion that the claims of the '111 Reissue are limited to single look-up tables. (*Id.* at 16). The state of the art at the time of the filing of the patent applications, argue Defendants, also supports the limitation of "assigning" to that of a single look-up table. (*Id.* at 16-18). Lastly, Defendants assert that because Plaintiff omitted any reference to spacial calculations made during a call in an interrogatory response, such omission is evidence of a disclaimer of such calculations. (*Id.* at 18-19).

800 Adept contends that the abstract, figures and other parts of the patents' specifications do not limit the claimed inventions to a single look-up table. (Doc. No. 268, pp. 3-5, 6-8). On the contrary, argues Plaintiff, the specifications specifically recite multiple embodiments, including relational or hierarchical database structures. (*Id.* at 4). 800 Adept also criticizes Defendants' reliance on statements made in an unrelated reexamination proceeding by the Examiner concerning the scope of the disclosure of the '111 Reissue. (*Id.* at 5-6).

Returning to the languages of the claims, Plaintiff asserts that the plain meaning of the term "assign" is not limited to any one methodology. (*Id.* at 8). 800 Adept avers that every database query is the equivalent of a mathematic calculation, and therefore the database embodiments disclosed in the specifications do require "calculations" to be made after a telephone call is placed by a caller. (*Id.* at 10-11). Moreover, Plaintiff argues that there is no way in which to perform the "assign" limitation to a caller using a mobile telephone prior to the actual telephone call. (*Id.* at 11-13). Lastly, Plaintiff argues that the passages from the prosecution history identified by Defendants do not address the "assigning" limitation of the claims and, in any event, do not disclaim calculations made during a telephone call. (*Id.* at 14).[3]

Based on the above, it is apparent that there are two general disagreements over the construction of this claim term. First, the parties debate whether the claims of the '111 Reissue and '689 Patent are limited to a single look-up table, or in other words whether the applicants disclaimed all embodiments except for a database containing a single table. Secondly, the

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[3] Plaintiff also presents an argument which relies on a portion of the Magistrate's *Markman* Order which was not adopted by the Court. (See Doc. No. 178, p. 39). Such reliance is misplaced. In addition, Plaintiff improperly attempts to incorporate by reference arguments presented in other documents. (*See* Doc. No. 268, p. 16). This practice is prohibited by Local Rule 3.01(b) which limits a response to a document to not more than twenty (20) pages.

parties dispute whether the assigning limitation disclaims calculations made during the telephone call.

As to the first issue, the Plaintiff plainly has the better argument. The claims, specification and prosecution history of the '111 Reissue and '689 Patent do not limit the term "assigning" to a single, static look-up table. The claims do not recite the term table; they recite the term database. The specification teaches that the database contains fields which can be used as natural keys and that the database structure may be relational or hierarchal. ('111 Reissue, col. 9, ll. 48-51). Thus, the specification plainly teaches database structures as alternatives to a single table database. Moreover, it is well settled that "the scope of the claims is not limited to particular embodiments depicted in the figures." *Lighting World, Inc. v. Birchwood Lighting, Inc.*, 382 F.3d 1354, 1365 (Fed. Cir. 2004). Therefore, without more, Defendants' arguments concerning Figure 1 from the patents is without merit.

Moreover, the passages selected from the patents' prosecution history do not clearly and unambiguously disclaim alternative database structures. *See Sorensen v. Int'l Trade Comm'n*, 427 F.3d 1375, 1378-79 (Fed. Cir. 2005) ("Disclaimers based on disavowing actions or statements during prosecution . . . must be both clear and unmistakable."). In each passage quoted from the prosecution history, applicants speak of a "database," not a table or a single look-up table. (*See* Doc. No. 240, pp. 10-11, 13).

Lastly, the Court finds no reason to limit the claims to a single look-up table from the statements of the Patent Office Examiner. First, "it is the applicant, not the examiner, who must give up or disclaim subject matter that would otherwise fall within the scope of the claims." *Sorensen,* 427 F.3d at 1379 (quoting *Innova/Pure Water, Inc.,* 381 F.3d at 1124). Secondly, the Examiner's statements in the '111 Reissue do not refer to a look-up table but rather to the database of the claimed invention. It is of no moment that the Examiner refers to the embodiment depicted in Figure 1. That argument has no more force in this context than when the Court construes the claims. *See Lighting World, Inc.,* 382 F.3d at 1365 ("[T]he scope of the claims is not limited to particular embodiments depicted in the figures."). Further, although the Examiner characterizes the '111 Reissue in an unrelated reexamination proceeding as implementing "a telephone number to telephone number lookup in a single table, or database," it is clear from the context of the statement that the Examiner was discussing the patent's *disclosure,* i.e., what the '111 Reissue teaches and not the scope of the claimed invention. (*See* Doc. No. 240, p. 16 n.33 & n.34). "Specifications teach. Claims claim." *SRI Int'l v. Matsushita Elec. Corp. of Am.,* 775 F.2d 1107, 1121 n.14 (Fed. Cir. 1985).

The parties also dispute whether the assigning limitation disclaims calculations made during the telephone call, and both parties delve into the prosecution history and state of the art to support their

positions. The Court addresses this dispute in two parts. First, the Court must determine when the "assigning" step occurs. Then, the Court determines whether there is a disclaimer of the scope of the claims.

The answer to the first question starts with the language of the claims. The claims of the '111 Reissue recite "assigning to [each originating telephone number[4] *or* the physical location[5]] of said potential first parties a telephone number of a service location of a second party that will receive calls originating from within the boundary of a geographic area." Similarly, claim 1 of the '689 Patent recites "assigning to the telephone number of each potential first party a telephone number of a specific location of the second party that will receive calls originating from within a geographic area of each first party."

"Assigning" is a commonly used and widely understood word. *See Phillips*, 415 F.3d at 1314. It means "to set aside for a particular purpose" or "designate." WEBSTER'S II NEW RIVERSIDE UNIVERSITY DICTIONARY 131 (1994). It is clear upon review of the specification that the patent uses the term in a manner consistent with its ordinary meaning without

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[4] This is the language used in claim 1 and claim 9 of the '111 Reissue.

[5] This language is used in claim 17, claim 29, and claim 41 of the '111 Reissue.

providing a more specialized meaning. *See Philips*, 415 F.3d at 1366.

As discussed above, the term "potential first parties" refers to individuals who can place a telephone call but have not done so. The use of the term "potential first parties" strongly suggests that the assignment occurs prior to the caller placing a telephone call. In addition, each and every one of the claims uses the future tense, i.e., "the second party that *will receive* calls." The use of the future tense in the claims also suggests that the event described by the verb, i.e., the call, has not happened yet.

A review of the specification also supports the conclusion that the assignment occurs prior to the placement of the telephone call. The '111 Reissue teaches that once a telephone call has been placed by an individual, a local exchange carrier contacts a long distance carrier ("LDC") for routing instructions. ('111 Reissue, col. 4, l. 60 to col. 5, l. 20). The LDC retrieves the routing instructions from its own network control point ("NCP") and passes those instructions back to the local exchange carrier. (*Id.*). The specification teaches that the NCP contains "all of the direct routing instructions for the WATS number." (*Id.*; *see also id.*, col. 5, ll. 24-51; *id.*, col. 5, ll. 45-53; *id.*, col. 8, ll. 14-22; *id.*, col. 8, ll. 39-48; *id.*, col. 8, l. 64 to col. 9, l. 6; *id.*, col. 9, ll. 23-32).

The specification also teaches the steps required to prepare the NPC for its role in this system. The written description discloses that "*[a]fter* defining the

trade areas, *assigning* the corresponding NPA-NXX (or NPA-NXX-XXXX) combinations and submitting the appropriate direct routing information to the chosen LDC, the system (network) is activated." (*Id.*, col. 12, ll. 38-41, emphasis added). In other words, the LDC does not receive the routing instructions that are stored in the NCP until *after* the assignment step is complete.

The abstract also supports this claim construction. It discloses:

> Once these coordinates are assigned to each of the potential callers, the *second party's criteria is applied to assign the potential caller to a second party. . . . Once all such assignments have been made,* a database is assembled to be used by a long distance carrier for direct routing of telephone calls from callers to an assigned second party.

(*Id.* at face page, emphasis added).

Consequently, the language of the claims when read in light of the specification refers to "a designation made prior to the telephone call of the first parties."

The Court also considers whether the applicant disclaimed calculations made after the telephone call. Nothing in the above analysis indicates that the applicant must have disclaimed further calculations. Indeed, the specification contemplates further processing

where the call is placed from a mobile telephone.[6] (*Id.*, col. 6, l. 59 to col. 7, l. 2).

Additionally, the prosecution history does not expressly and unambiguously disclaim all calculations made after a telephone call is placed. In distinguishing a prior art reference, the applicant stated:

> A second major distinction between Finucane, *et al.* patent and Applicant's system is that Finucane, *et al.* requires that a computer perform "point of origin" to "point of termination" calculations while the caller is on the line. . . .
>
> On the other hand, Applicant's Direct Routing Telephone System performs all such calculations prior to the call even being made and, in fact, prior to the delivery of the data base [sic] to the Long Distance Carrier (LDC).

(Doc. No. 240, Ex. C, pp. 123). Similar statements are quoted by Defendants on pages 9 to 13 of docket number 240. These statements are, at best, ambiguous. They might refer to the timing of the "assigning" step or they might refer to the disclaimer of post telephone call calculations. The Court finds the former is the better view in light of the disclosure of the specification as a whole. In any event, such

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[6] Plaintiff's argument concerning the "cell phone embodiments" supports only the proposition that further calculations were contemplated once the technology was available.

ambiguity prevents the applicant's statements in the prosecution history from serving as a disclaimer of claim scope.

Means-Plus-Function Limitations

Neither party offers the Court an argument concerning the means-plus-function limitations recited in claim 1 and claim 17 of the '111 Reissue. In order to construe these claims, the Court must identify the function of the limitation and then determine the corresponding structure disclosed in the specification. *Medtronic, Inc.*, 248 F.3d at 1311. In addition, the Court must identify whether the corresponding structure is clearly linked or associated with the recited function. *Id.*

The Court grants leave to each party to submit one five (5) page memorandum on this issue. The memorandum shall (1) identify the function, (2) identify the corresponding structure disclosed in the specification, and (3) identify whether the corresponding structure is clearly linked or associated with the recited function.

The Shaffer-Moore Patents

The parties also dispute the meaning of the term "spatial key" which appears in the claims of nearly all of the Shaffer-Moore Patents. Defendants' proposed definition is "a single number that identifies a small, specific geographically defined area, line, or point

that is defined by a set or sets of coordinates." (Doc. No. 240, pp. 19-20). In support of this definition, Defendants point to the use of the term in the specification of the patents and to the construction given to this term by the United States District Court for the Eastern District of Virginia. (*Id.*).

800 Adept argues that "spacial key" should be construed as that term was defined in the Shaffer-Moore Patents. (Doc. No. 268, pp. 17-20). Plaintiff contends that it would be inappropriate to insert "small" in the definition of this term because (1) the specification does not limit spacial keys to "small" geographic areas but merely calls these "preferred" or "unique," (2) "small" adds nothing to the definition because it is a relative term, and (3) the ruling of the District Court of the Eastern District of Virginia is not binding on this Court. (*Id.*).

Although the Court recognizes that a uniform treatment of claim construction is desirable, the claim construction of another district court in no way binds this Court under the instant circumstances. The parties provide only a single Order of the Court, without its reasoning, discussion of the arguments of the parties, or reference to the underlying facts. The claim construction of the Virginia District Court was not appealed to the Federal Circuit. Defendants do not provide any authority that would afford that Order preclusive effect. Defendants do not argue that issue preclusion, collateral estoppel, or judicial estoppel are applicable. Simply put, this Court "will render its own independent claim construction." *See Maurice*

Mitchell Innovations, L.P. v. Intel Corp., 2006 WL 1751779, *4 (E.D. Tex. 2006).

The Court construes "spacial key" as that term is taught in the specification of the '897 Patent. It is defined there as:

> The spacial key is a single number that identifies a specific geographically defined area, line, or point that is defined by a set of coordinates.

('897 Patent, col. 9, ll. 39-42). The specification discloses that the spacial key can be "a coded version of the coordinate description of" "simple geographies like points and rectangles." (*Id.*, col. 9, ll. 43-45). Further, the specification teaches:

> The postal zip+4 code is the preferred spacial key used to link the master table to the client table, but there are other small geographic areas capable of having unique spacial keys, such as zip+6 code areas, census blocks, or very small latitude/longitude grids, tiles, windows, or quad-trees.

(*Id.*, col. 9, ll. 46-50). Except for this single reference, the figures, tables, and disclosure of the specification only disclose the use of a zip+4 code as a spacial key. (*See id.*, col. 11, l. 45 to col. 12, l. 12; *id.*, col. 12, ll. 40-50; *id.*, col. 13, ll. 8-30; *id.*, col. 17, ll. 29-33; *id.*, col. 21, ll. 38-40; *id.*, col. 24, ll. 13-16; *id.*, col. 24, ll. 30-34).

The specification also characterizes the operation of prior routing systems and their problems. Prior art

systems, the applicants note, "are very coarse in their level of precision and cannot handle small service areas with legally defined franchise territories like pizza delivery." (*Id.*, col. 3, ll. 35-37). Another problem with prior art routing systems "is that they divide the United States into many large arbitrarily defined areas and there is no ability to route a call to the closest service location if the closest location is not located in the same artificially created area as the caller." (*Id.*, col. 3, ll. 48-52). Moreover, the specification teaches that the desired system should "not use artificially created areas such as telephone wire centers, telephone prefixes, or 5-digit zip codes where calls can only be routed within their area." (*Id.*, col. 3, ll. 56-59). The specification also characterizes U.S. Postal Service zip+4 codes as "small geographic areas" and the first six digits of the Automatic Number Identification system as designating a "fairly large" area. (*Id.*, col. 4, ll. 53-56; *id.*, col. 4, ll. 64-67).

Accordingly, two strands wind through the disclosure of the Shaffer-Moore Patents. On the one hand, the Shaffer-Moore Patents teach that a spacial key is a single number that identifies a specific geographic area. The size of the geographic area is omitted; it is the specificity or "uniqueness" of the area that is important. On the other hand, the specification also systematically discloses the advantages of choosing "small" geographic areas to use a spacial keys. In particular, the use of telephone exchange numbers and five-digit zip codes is disparaged while the use of zip+4 and similarly-sized or smaller geographic areas

is touted. Nevertheless, there is no explicit or manifest disclaimer in the specification requiring that spacial keys must be small, specific geographically-defined areas.

The Federal Circuit instructs courts that "the claims of the patent will not be read restrictively unless the patentee has demonstrated a clear intention to limit the claim scope using words or expressions of manifest exclusion or restriction." *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 907-08 (Fed. Cir. 2004) (quotation omitted). Last year, the Federal Circuit followed this maxim in *Gillette Co. v. Energizer Holdings, Inc.*, 405 F.3d 1367, 1374 (Fed. Cir. 2005).

In that case, the patent-in-suit claimed a wet-shave safety razor with multiple blades. *Id.* at 1369. Specifically, the patent claimed a "safety razor comprising . . . a group of first, second, and third blades," but the defendant manufactured a four-blade safety razor. *Id.* After reviewing the patent specification, the District Court limited the scope of the claim to a razor having solely three-blades. *Id.* On appeal, the Federal Circuit reversed this claim construction. *Id.* at 1374.

After discussing the use of open language in the claim, the Court focused on the patent's written description. *Id.* at 1373. The specification, noted the Court, first characterized the scope of the invention broadly when it taught that the invention relates to safety razors having blade units with a plurality of blades. *Id.* The Court then emphasized that although

the specification makes numerous references to a preferred embodiment with three blades, such "narrower embodiment does not impose a limit on the broader claim language as elucidated by the reference to 'the invention' as embracing a 'plurality of blades.'" *Id.* at 1374. Additionally, despite the numerous cites to three-bladed razors plucked from the written description, the Court noted that "no statement in the patent surrenders or excludes a four-bladed razor." *Id.*

The written description of the Shaffer-Moore Patents is similar to the written description at issue in *Gillette.* In each case, the written description broadly defines a claim term but nonetheless provides a disclosure of examples of limited scope. As in *Gillette,* this Court will construe the term broadly because there is no explicit or manifest disclaimer of claim scope in the Shaffer-Moore Patents.

Accordingly, the Court construes "spacial key" to mean "a single number that identifies a specific geographically defined area, line, or point that is defined by a set of coordinates."

Conclusion

Based on the foregoing, the Court **GRANTS** Defendants' Markman Motion (Doc. No. 240) and rules as follows:

1. As recited in the '111 Reissue and the '689 Patent, the term "potential first parties" refers to "individuals who can place a telephone call but have not yet done so";

2. As recited in the '111 Reissue and the '689 Patent, the term "assigning" refers to "a designation made prior to the telephone call of the first parties";

3. As recited in the Shaffer-Moore Patents, the term "spacial key" refers to "a single number that identifies a specific geographically defined area, line, or point that is defined by a set of coordinates"; and

4. The parties shall within five (5) days of the date of this Order file with the Court a memorandum addressing the means-plus-function claims of the '111 Reissue. The memorandum of each party shall be no more than five (5) pages in length and shall (1) identify the function, (2) identify the corresponding structure disclosed in the specification, and (3) identify whether the corresponding structure is clearly linked or associated with the recited function. The opposing party may then file a memorandum in opposition within ten (10) days of the date of this Order. A memorandum in opposition shall also be no more than five (5) pages in length.

DONE and **ORDERED** in Chambers in Orlando, Florida on August 3, 2006.

/s/ Patricia C. Fawsett
PATRICIA C. FAWSETT,
CHIEF JUDGE
UNITED STATES
DISTRICT COURT

Copies furnished to:

Counsel of Record

UNITED STATES DISTRICT COURT
MIDDLE DISTRICT OF FLORIDA
ORLANDO DIVISION

800 ADEPT, INC., and ADEPTEL, INC.,

Plaintiffs/Counter-Defendants,

-vs-

MUREX SECURITIES, LTD., MUREX LICENSING CORPORATION, TARGUS INFORMATION CORPORATION, and WEST CORPORATION,

Defendants/Counter-Plaintiffs.

Case No. 6:02-cv-1354-Orl-28DAB

ORDER

(Filed Apr. 12, 2007)

This case comes before the Court for ruling on the following:

1. Motion (And Memorandum) For Entry of Final Judgment, An Award Of Prejudgment Interest And A Permanent Injunction (Doc. No. 430, filed November 8, 2006);

2. Motion And Memorandum To Award Plaintiff's Attorneys' Fees (Doc. No. 431, filed November 9, 2006);

3. Defendants' Combined Response To Plaintiff's Motions For Entry Of Final Judgment, An Award

Of Prejudgment Interest, A Permanent Injunction, And Attorneys' Fees (Doc. No. 442, filed November 29, 2006);

4. Plaintiff's Motion And Memorandum To Strike Improper Submissions Contained in Docket No. 442 (Doc. No. 448, filed December 12, 2006); and

5. Defendants' Opposition To Plaintiff's Motion And Memorandum To Strike Improper Submissions Contained In Docket No. 442 (Filed At Docket 448) (Doc. No. 452, filed December 26, 2006).

I. Background of the Case

After a twenty-four day trial, a jury found that Defendants, Murex Securities, Ltd., Murex Licensing Corporation, and TARGUS Information Corporation ("the Murex-Targus Parties"), willfully infringed claims from two United States patents owned by Plaintiff 800 Adept, Inc. ("800 Adept"). More specifically, the jury found that the Murex-Targus Parties willfully infringed claims 1-19, 22-27, 29, 31, 34-39, 41, 43, and 46-51 of U.S. Patent No. RE36,111 ("the '111 Reissue") and claims 1 and 3-5 of U.S. Patent No. 5,805,689 ("the '689 Patent"). (Doc. No. 425, pp. 1-4). The jury found that such claims of the '111 Reissue and the '689 Patent were not invalid, and the Court determined later that the subject patents were not unenforceable. (*Id.* at 2-3; Doc. No. 470, filed April 2, 2007). For such infringement, the jury determined that the Murex-Targus Parties should pay $18,000,000.00 in damages to 800 Adept. (*Id.* at 3). The jury also found that Defendant West Corporation

("West") infringed claims 1-19, 22-27, 29, 31, 34-39, 41, 43, and 46-51 of the '111 Reissue.[1] (*Id.* at 2). The jury found that West did not willfully infringe such claims and that it should pay 800 Adept $48,000.00 in damages. (*See* Doc. No. 425, pp. 3-4).

800 Adept now asks this Court to (1) award prejudgment interest on its claims, (2) enjoin the Murex-Targus Parties[2] from engaging in further acts of infringement, (3) award enhanced damages against the Murex-Targus Parties, and (4) an award of attorneys' fees under Title 35 U.S.C. § 285. (Doc. Nos. 430, 431). In addition to the above remedies, 800 Adept also requests that the Court enter final judgment in this case.

II. Prejudgment Interest

800 Adept's request for prejudgment interest actually concerns two separate issues and two separate bodies of law, although neither 800 Adept nor the Targus-Murex Parties and West bring this to the Court's attention. The Court considers first 800 Adept's request for prejudgment interest on its successful state law tort claims and then whether to award prejudgment interest for 800 Adept's patent infringement claims.

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[1] The jury was charged with instructions detailing both direct and indirect infringement.

[2] 800 Adept does not seek to enjoin the actions of West.

A. Prejudgment Interest For Florida Tort Claims

Florida courts consider prejudgment interest an element of pecuniary damages under the "loss theory." *Argonaut Ins. Co. v. May Plumbing Co.*, 474 So. 2d 212, 215 (Fla. 1985); *see also Gilchrist Timber Co. v. ITT Rayonier, Inc.*, 472 F.3d 1329, 1331 (11th Cir. 2006). There are two prerequisites to the award of prejudgment interest as damages: (1) an out-of-pocket pecuniary loss and (2) a fixed date of loss. *Underhill Fancy Veal, Inc. v. Padot*, 677 So. 2d 1378, 1380 (Fla. Dist. Ct. App. 1996). Prejudgment interest is generally not awarded, however, for tort damages because such damages are generally too speculative to liquidate before final judgment. *Lumbermens Mut. Casualty Co. v. Percefull*, 653 So. 2d 389 (Fla. 1995); *see also Nat'l R.R. Passenger Corp. v. Roundtree Trasp. & Rigging, Inc.*, 286 F.3d 1233, 1259 (11th Cir. 2002). This rule is not absolute, however, and prejudgment interest may be awarded for tort damages where there has been an ascertainable, out-of-pocket loss occurring at a specific time prior to the entry of the judgment. *See Underhill Fancy Veal, Inc.*, 677 So. 2d at 1380; *see also Alvarado v. Rice*, 614 So. 2d 498 (Fla. 1993). Prejudgment interest also can be awarded in tort cases where there is a loss of vested property right, such as claims involving the negligent destruction of a building, the wrongful withholding of sales commissions, or a subcontractor's mechanic's lien. *See Alvarado*, 614 So. 2d at 499.

In the instant case, 800 Adept has not shown that it has suffered an ascertainable, out-of-pocket loss related to its state tort claims at a time prior to the entry of judgment or that it suffered the loss of a vested property right. 800 Adept's theory of liability on its state law claims revolved around Defendants' actions toward five different third parties whom, at one time, had business relationships with 800 Adept. Ms. Denise Dauphin, the financial expert for 800 Adept on the subject of damages, opined at trial that 800 Adept had lost over $3.4 million in revenues from the Murex-Targus Parties' tortious interference with these five customers. (October 20, 2006 Testimony of Denise Dauphin, hereinafter "Dauphin Test."). Of this amount, Ms. Dauphin testified that lost profits represented approximately $2,239,973.00 or, when discounted, $1,863,999.00. (*Id.*).

The jury, however, determined that 800 Adept should be awarded $2,000,000.00 for the Murex-Targus Parties' tortious interference, an amount that is greater than Ms. Dauphin's discounted lost value calculations but less than her lost revenue and her non-discounted lost profits calculation. It is unclear from the verdict whether the jury did not adopt the rate at which Ms. Dauphin discounted 800 Adept's lost profits; whether the jury did not adopt the rate at which Ms. Dauphin calculated lost profits from 800 Adept's lost revenue; or whether the jury based its finding of tortious interference on less than all of the business relationships asserted by 800 Adept. Critically, because the Court cannot determine from the

general verdict which relationship(s) was the basis for the jury's finding of damages, it also cannot ascertain a date upon which 800 Adept's liability may spring. *See, e.g., Perdue Farms Inc. v. Hook*, 777 So. 2d 1047, 1054-55 (Fla. Dist. Ct. App. 2001) (finding that it was impossible to determine any date upon which the plaintiff was injured in a claim for unjust enrichment where the jury could have chosen one of a number of dates but did not). The Court, therefore, determines that 800 Adept is not entitled to prejudgment interest on its state law claim of tortious interference.

B. Prejudgment Interest For Patent Infringement Claims

Title 35 U.S.C. § 284 provides that, upon finding a claim of patent infringement, courts "shall award the claimant damages adequate to compensate for the infringement, . . . together with interest and costs as fixed by the court." This provision, according to the U.S. Supreme Court, compels courts to ordinarily award prejudgment interest so that the patent holder would be in as good a position as it would have been had the infringer entered into a reasonable royalty agreement. *See Gen. Motors Corp. v. Devex Corp.*, 461 U.S. 648 (1983). Thus, the Court found that prejudgment interest should be awarded under Section 284 absent some justification for withholding such award. *Id.* at 657.

However, Section 284 does not require the award of prejudgment interest whenever infringement is found. *Id.* The statute provides that "interests and costs" should be "fixed by the court", which the Supreme Court has construed to leave some discretion to the district court in awarding prejudgment interest. *Id.* "For example, it may be appropriate to limit prejudgment interest, or perhaps even deny it altogether, where the patent owner has been responsible for undue delay in prosecuting the lawsuit." *Id.* The Court of Appeals for the Federal Circuit interprets this reasoning to mean that the justification for withholding prejudgment interest must have some relation to the reasons for awarding it. *See Radio Steel & Mfg. Co. v. MTD Prods., Inc.*, 788 F.2d 1554, 1558 (Fed. Cir. 1986).

In this case, it is clear that 800 Adept and the Murex-Targus Parties knew that each was a potential competitor of the other party from a very early date. By November of 1996, the principals of both sides, Juan Sierra for 800 Adept and George Moore for the Murex-Targus Parties, had exchanged correspondence. (September 21, 2006 Testimony of Juan Sierra, hereinafter "Sep. 21 Test.").

A few months later, in December of 1996, the U.S. Patent and Trademark Office ("Patent Office") issued to 800 Adept the original patent of the '111 Reissue, U.S. Patent No. 5,588,048 ("the '048 Patent"). (*See* Def. Ex. 13). Although 800 Adept would later assert claims against the Murex-Targus Parties that originally appeared in the '048 Patent, it did not

do so in 1996 or 1997. 800 Adept filed a broadening reissue application for the '048 Patent on May 21, 1997, and the Patent Office reissued the '048 Patent, with a number of new claims, as the '111 Reissue on February 23, 1999. In addition, the Patent Office issued the '698 Patent on September 8, 1998.

In 1997, Juan Sierra received information from Ross Shanken, who was then acting as a salesperson for the Murex-Targus Parties, about the Murex-Targus Parties' services. (Sep. 21 Sierra Test.). Mr. Shanken had called Mr. Sierra to sell the Murex-Targus Parties' services to 800 Adept. (*Id.*). "Intrigued", Mr. Sierra requested that the Murex-Targus Parties' technical people meet with 800 Adept's technical people. (*Id.*). James Shaffer, who was one of the representatives from the Murex-Targus Parties, divulged to 800 Adept at the subsequent meeting that Targus possessed a database of about 125 million geocoded telephone numbers and that a large number of additional numbers were assigned proxy locations, which struck Mr. Sierra as "as being a near identical copy of predominance." (Sep. 21 Test.").

In September of 1997, 800 Adept, through its attorney, contacted Western Interactive Media, which was later known as Patriot Communications ("Patriot"), about allegedly infringing telephone call routing services that Patriot provided its customers.[3]

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[3] Patriot served as the marking company for another closely-related entity, Access Long-Distance, which acted as the

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(Def. Ex. 174). In response, Patriot chose to terminate its relationship with the Murex-Targus Parties, with whom it had contracted for its telephone call routing services, and use the technology of 800 Adept. (Def. Ex. 176; September 22, 2006 Testimony of Juan Sierra, hereinafter "Sep. 22 Sierra Test."). In so doing, Patriot asked that 800 Adept provide each "routing solution" in the format that had been supplied by the Murex-Targus Parties.[4] Thus, by the end of 1997, 800 Adept understood that the Murex-Targus Parties were providing information for telephone routing services, including the latitude and longitude of individual telephone numbers. (*See* Sep. 22 Sierra Test.).

After this time, 800 Adept began to assert its patent rights in the marketplace. In May of 2000, 800 Adept, acting again through its attorney, advised Budget Group, Inc. ("Budget") that its plan to obtain call routing services from the Murex-Targus Parties

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telecommunications platform for routing services. (Sep. 21 Sierra Test.). For simplicity, the Court will refer to both companies as Patriot in this Order.

[4] The "routing solution" references the instructions that are used by the telecommunication platform to route the telephone call or the information that the telecommunications platform needed to calculate such solution. At this time, 800 Adept was supplying a plurality of such routing solutions in a single-table database to its customers. The Murex-Targus Parties, on the other hand, developed a query-based business model in which its customers would not be provided a database but would instead contact a server maintained by the Murex-Targus Parties for routing solutions, as needed.

potentially infringed 800 Adept's patents. (Def. Ex. 228). By July of 2000, both Targus and AT& T responded to 800 Adept's letter and denied that the telephone routing system which they offered Budget infringed 800 Adept's patent claims. (Def. Exs. 230, 231). In this correspondence and correspondence regarding the patents owned by the Murex-Targus Parties, 800 Adept and its attorney argued positions of infringement and validity that were different than those ultimately relied upon by 800 Adept's counsel in this case.

Moreover, during this time, the Murex-Targus Parties developed and began to market the telephone call routing systems that were found to be infringing by the jury in this case. Unlike the routing system initially developed by 800 Adept, the Murex-Targus Parties developed a query-based business model that delivered each routing solution to its customers upon their request. The Murex-Targus Parties revenue from its routing customers grew from 1997 until 2005.

800 Adept did not initiate this lawsuit until November 13, 2002.[5]

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[5] Juan Sierra maintained at trial that 800 Adept is a small company with limited financial resources that would be at a disadvantage if brought into a lawsuit against the large, well-funded operation of the Murex-Targus Parties. (September 22, 2006 Testimony of Juan Sierra). Contemporaneous correspondence supports Mr. Sierra's testimony. (Def. Ex. 176).

This lawsuit was the result of a long-running and contentious dispute between two competitors in the field of telephone call routing services. 800 Adept knew or should have known, based on the evidence adduced at trial and more particularly upon the testimony of Juan Sierra, its principal and owner, that the Murex-Targus Parties were providing potentially infringing services to third parties as early as 1997.

Even assuming that 800 Adept would not be in a position to assert its patent rights until after the Patent Office issued the '111 Reissue on February 23, 1999,[6] 800 Adept still waited almost three years and nine months to file this lawsuit. There is precedent which views delay as a self-serving litigation tactic that causes damages to escalate and prejudices infringers. *Crystal Semiconductor Corp. v. TriTech Microelectronic Int'l, Corp.*, 246 F.3d 1336, 1362 (Fed. Cir. 2001) (holding that a two year delay in bringing a patent infringement suit prejudiced the infringer and constituted an undue delay). The delay in the instant case might not have been an intentional litigation tactic,[7] but it nonetheless prolonged resolution of the

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[6] By 1998, the Patent Office had issued the '689 Patent, claims from which 800 Adept also asserted in the instant case.

[7] The evidence at trial shows that 800 Adept did not file this lawsuit until after the Murex-Targus Parties began asserting their patent rights against 800 Adept's customers. Although there is sufficient evidence of record for the jury to find that the Murex-Targus Parties' actions were part of a broader scheme to

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underlying business dispute. During the delay, 800 Adept's attorney took positions on its patents that were different from those that were successfully asserted by 800 Adept at trial. Further, during the delay, the Murex-Targus Parties were investing in a telephone routing system based on a different business model than 800 Adept and were developing their presence in the marketplace. In view of these circumstances, the Court declines to award 800 Adept prejudment interest for its claims of patent infringement.

III. Permanent Injunction

Title 35 U.S.C. § 283 provides that "[t]he several courts having jurisdiction of cases under this title may grant injunctions in accordance with the principles of equity to prevent the violation of any right secured by patent, on such terms as the court deems reasonable." The standard for a permanent injunction is essentially the same as for a preliminary injunction except that the plaintiff must show actual success on the merits instead of a likelihood of success. *See Amoco Prod. Co. v. Village of Gambell*, 480 U.S. 531, 546 n. 12 (1987). The Supreme Court recently made clear that courts should apply the traditional four-factor test used by court of equity when considering whether to award permanent injunctive relief to a

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isolate 800 Adept from its customers, 800 Adept still delayed filing suit a significant period of time.

prevailing patent holder. *See eBay, Inc. v. MercExchange, L.L.C.*, ___ U.S. ___, ___, 126 S. Ct. 1837, 1839 (2006). The patent holder must demonstrate: "(1) that it has suffered an irreparable injury; (2) that remedies available at law, such as monetary damages, are inadequate to compensate for that injury; (3) that, considering the balance of hardships between the plaintiff and defendant, a remedy in equity is warranted; and (4) that the public interest would not be disserved by a permanent injunction." *Id.* The Court held that "the discretion whether to grant or deny injunctive relief rests within the equitable discretion of the district courts, and that such discretion must be exercised consistent with traditional principles of equity, in patent disputes no less than in other cases governed by such standards." *Id.* at 1841.

A. Application of the Traditional Four-Part Test

1. Irreparable Harm

Irreparable harm is intended to serve as a measure of the quality or severity of harm that is necessary to trigger equitable intervention. *Id.* The Murex-Targus Parties assert that 800 Adept's delay in filing the instant lawsuit demonstrates a lack of irreparable harm.[8] (Doc. No. 442, pp. 16-17). In support, the

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[8] As far as the Court can discern from the extensive record in the instant case, the Murex-Targus Parties have never to date argued that 800 Adept's claims are barred by the equitable

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Murex-Targus Parties point to a number of court opinions which consider, on motion for a preliminary injunction, the relationship between the nature of alleged harm and movant's delay in seeking injunctive relief. (*Id.*). The Court, too, has found a large number of cases that discuss the consideration that may be given to a movant's delay when determining irreparable injury in the context of a preliminary injunction, but the Court' research has uncovered only one opinion that considered such delay on motion for a permanent injunction.[9]

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doctrine of laches. *See, e.g., A.C. Aukerman Co. v. R.L. Chaides Constr. Co.*, 960 F.2d 1020, 1032 (Fed. Cir. 1992). Accordingly, the Court deems such an argument waived if the Murex-Targus Parties are attempting to raise it here in the first instance.

[9] *See TiVo, Inc. v. Echostar Commc'ns Corp.*, 446 F. Supp. 2d 664, 670 (E.D. Tex. 2006) (finding that such argument is irrelevant in the context of a permanent injunction). All other opinions addressed delay in the context of preliminary injunctions. *See, e.g., Polymer Techs., Inc. v. Bridwell*, 103 F.3d 970 (Fed. Cir. 1996) (finding four month delay does not rebut a presumption of irreparable harm in the context of a preliminary injunction); *High Tech Med. Inst., Inc. v. New Image Indus., Inc.*, 49 F.3d 1551 (Fed. Cir. 1995) (a seventeen month delay militates against a finding of irreparable harm in a request for preliminary injunction); *Nutrition 21 v. United States*, 930 F.2d 867 (Fed. Cir. 1991) (finding patent holder's "substantial period" of delay negates a finding of irreparable harm for preliminary injunction); *T.J. Smith & Nephew Ltd. v. Consol. Med. Equip., Inc.*, 821 F.2d 646 (finding fifteen month delay militates against a finding of irreparable harm in the context of a preliminary injunction); *Atari Corp. v. Sega of Am., Inc.*, 869 F. Supp. 783 (N.D. Cal. 1994) (failure to show irreparable harm where the

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Of course, both types of injunctive relief look toward the future. *See Dombrowski v. Pfister*, 380 U.S. 479, 485 (1965); *United States v. Or. State Med. Soc'y*, 343 U.S. 326, 333 (1952) ("The sole function of an action for injunction is to forestall future violations."). The purpose of preliminary injunctive relief is to restrain or compel conduct in those extraordinary situations where irreparable injury might result from inaction or delay. *See Alabama v. U.S. Army Corps of Eng'rs*, 424 F.3d 1117, 1133 (11th Cir. 2005). It also serves to preserve the relative positions of the parties until a trial on the merits. *Id.* In this regard, the Court of Appeals for the Eleventh Circuit has called irreparable harm the *sine qua non* of injunctive relief. *Id.* at 1133 (quoting *N.E. Fla. Chapter of Ass'n of Gen. Contractors of Am. v. City of Jacksonville*, 896 F.2d 1283, 1285 (11th Cir. 1990)). The harm considered by the Court, however, is "confined to that which might occur in the interval between ruling on the preliminary injunction and trial on the merits." *Id.* at 1134.

A permanent injunction, in contrast, can issue only after the right to injunctive relief has been firmly established at a trial on the merits of the movant's claims. *Amoco Prod. Co.*, 480 U.S. at 546 n. 12. Although irreparable harm is an essential finding where the movant seeks a preliminary injunction, a

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patent holder delayed over seven years before requesting preliminary injunctive relief).

request for a permanent injunction usually turns on the unavailability of an adequate remedy at law. *See Lewis v. S.S. Baune*, 534 F.2d 115, 1123-24 (5th Cir. 1976).[10] Irreparable injury is one basis, however, for showing the inadequacy of any legal remedy, and as noted by the Court of Appeals for the Fifth Circuit, "[o]ften times the concepts of 'irreparable injury' and 'no adequate remedy at law' are indistinguishable" in the context of a permanent injunction.[11] *Id.* at 1124.

With this background in mind, the argument of the Murex-Targus Parties concerning 800 Adept's delay is much more persuasive in the context of a preliminary injunction. There, a court must carefully weigh harm that is imminent or that which arises in inaction with the goal of maintaining the status quo between the parties. A court confronted with a movant who unreasonably delayed seeking such relief should rightly question whether the request for a preliminary injunction was to address an irreparable injury rather than a shrewd litigation tactic. Here, in contrast, 800 Adept has established the merits of its claims, and its past conduct does little, if anything, to inform the question of whether 800 Adept will be

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[10] The Eleventh Circuit adopted as binding precedent all cases decided by the Former Fifth Circuit Court of Appeals prior to the close of business on September 30, 1981. *Bonner v. City of Prichard*, 661 F.2d 1206, 1207 (11th Cir. 1981).

[11] For a more thorough discussion of the countervailing considerations for granting preliminary injunctive relief and permanent injunctive relief, *see* Douglas Laycock, *The Death of the Irreparable Injury Rule*, 103 HARV. L. REV. 687 (1990).

harmed by any future acts of infringement by the Murex-Targus Parties. *See TiVo, Inc. v. Echostar Commc'ns Corp.*, 446 F. Supp. 2d 664, 670 (E.D. Tex. 2006).

Furthermore, even assuming the body of law concerning delay in preliminary injunction cases applies here, a showing of delay alone does not preclude a determination of irreparable harm. *Hybritech Inc. v. Abbott Labs.*, 849 F.2d 1446, 1457 (Fed. Cir. 1988). A patent holder's delay is only one factor that the Court must consider within the totality of the circumstances. *Id.*

In the instant case, 800 Adept and the Murex-Targus Parties are competitors in the market for telephone call routing services. A competitor has a "right, granted by Congress, not to assist its rivals with the use of proprietary technology." *Novozymes A/S v. Genencor Intern., Inc.*, 2007 W.L. 506828 (D. Del. 2007). Moreover, where a company pioneers an invention in the marketplace, irreparable harm flows from a competitor's attempts to usurp the pioneering company's market position and goodwill. *MPT, Inc. v. Marathon Labels, Inc.*, 2007 W.L. 184747 (N.D. Ohio 2007); *TiVo, Inc. v. Echostar Commc'ns Corp.*, 446 F. Supp. 2d 664, 669 (E.D.Tex. 2006); *see also Reebok Int'l, Ltd. v. J. Baker, Inc.*, 32 F.3d 1552, 1557 (Fed. Cir. 1994); *Atlas Powder Co. v. Ireco Chems.*, 773 F.2d 1230, 1233 (Fed. Cir. 1985); *Smith Int'l, Inc. v. Hughes Tool Co.*, 718 F.2d 1573, 1580-81 (Fed. Cir. 1983). The evidence presented at trial demonstrated that the Murex-Targus Parties attempted to reduce

the market share of 800 Adept through various means, some of which were the bases of the jury's verdict of toritious interference. Such evidence supports a finding of irreparable harm. *See TiVo, Inc.*, 446 F. Supp. 2d at 670 (finding irreparable harm where "the impact of Defendants' continued infringement is shaping the market to Plaintiff's disadvantage and results in long term customer loss).

In view of the above, the Court concludes that the harm caused by the conduct of the Murex-Targus Parties outweighs whatever consideration 800 Adept's delay in bringing suit should be given. Thus, 800 Adept has shown irreparable harm.

2. Inadequate Remedy at Law

The inadequate remedy prong of the traditional four-part test for an injunction is focused on the possibility of alternative modes of relief, regardless of the seriousness of the injury. *Lewis*, 534 F.2d at 1124. In this case, the Murex-Targus Parties argue that 800 Adept may be compensated for any continuing infringement with money damages, which would be an adequate remedy at law. (Doc. No. 442, p. 20). The Murex-Targus Parties contend that 800 Adept cannot simply rest on its patent right to exclude for injunctive relief to issue. (*Id.*). These arguments are not persuasive.

"The patent statute provides injunctive relief to preserve the legal interests of the parties against future infringement which may have market effects

never fully compensable in money. Because the principal value of a patent is its statutory right to exclude, the nature of the patent grant weighs against holding that monetary damages will always suffice to make the patentee whole." *Reebok Int'l, Ltd. v. J. Baker, Inc.*, 32 F.3d 1552, 1557 (Fed. Cir. 1994) (internal citation omitted). In other words, injunctive relief operates to protect the interests of a patentee against future infringement, the market effects of which may not be fully compensable in the form of monetary damages.

In this case, 800 Adept is seeking to prevent the Murex-Targus Parties from practicing future acts of infringement. It has already proven such infringement on the merits to the satisfaction of a jury. 800 Adept has proven that the Murex-Targus Parties compete with it in the market for telephone call routing services, and the Murex-Targus Parties concede that they have many more customers than 800 Adept. Furthermore, at least some of those customers where obtained, in the view of the jury in the instant case, through the Murex-Targus Parties' tortious conduct. To allow the Mures-Targus Parties to continue to offer their infringing services in the marketplace under such circumstances in direct competition with 800 Adept would be inequitable.

In addition, the fact that an infringing defendant has apparently, at least temporarily, ceased its infringement is not a basis to deny a permanent injunction against future infringement unless the evidence is very persuasive that the infringing defendant will

not resume its infringement. *See W.L. Gore & Assocs. v. Garlock, Inc.*, 842 F.2d 1275, 1281-82 (Fed.Cir.1988). The Murex-Targus Parties offer no such evidence here.

3. Balancing the Hardships

On the one hand, the record shows that 800 Adept is primarily involved in offering its services in the telephone call routing market and that it possesses a small share of that market. On the other hand, the provision of telephone routing services is a very small part of the business of the Murex-Targus Parties, although they service a much large portion of the telephone call routing market than 800 Adept. Thus, a properly circumscribed injunction would permit the Murex-Targus Parties to continue as an ongoing business concern while protecting the interests of 800 Adept. *See TiVo Inc.*, 446 F. Supp. 2d at 670.

4. Public Interest

Lastly, the public interest would not be disserved by a permanent injunction. "The public has an interest in maintaining a strong patent system." *Id.* There is no evidence of record that suggests that the Murex-Targus Parties' infringing services are related to any issue of public health or some other critical public interest.

In conclusion, the Court finds that, upon balancing the factors of the traditional test for equitable relief, the requested injunctive relief should be granted.

B. Form and Scope of the Permanent Injunction

The form and scope of a permanent injunction is governed by Federal Rule of Civil Procedure 65(d), which provides as follows:

> Every order granting an injunction and every restraining order shall set forth the reasons for its issuance; shall be specific in terms; shall describe in reasonable detail, and not by reference to the complaint or other document, the act or acts sought to be restrained; and is binding only upon the parties to the action, their officers, agents, servants, employees, and attorneys, and upon those persons in active concert or participation with them who receive actual notice of the order by personal service or otherwise.

FED. R. CIV. P. 65(d). "In accord with the policy of Rule 65(d), the Supreme Court has denounced broad injunctions that merely instruct the enjoined party not to violate a statute," because such "injunctions increase the likelihood of unwarranted contempt proceedings for acts unlike or unrelated to those originally judged unlawful." *Int'l Rectifier Corp. v. IXYS Corp.*, 383 F.3d 1312, 1316 (Fed. Cir. 2004). The Federal Circuit has vacated as overly broad

injunctions that "failed to state which acts constituted infringement or to expressly limit [their] prohibition to the manufacture, use, or sale of the specific device found to infringe, or devices no more than colorably different from the infringing device." *Id.* Thus "the only acts the injunction may prohibit are infringement of the patent by the adjudicated devices and infringement by devices not more than colorably different from the adjudicated devices." *Id.*; *see also Riles v. Shell Exploration & Prod. Co.*, 298 F.3d 1302, 1311 (Fed. Cir. 2002) ("[A]n injunction cannot impose unnecessary restraints on lawful activity").

In the instant case, there is sufficient evidence to enjoin the Murex-Targus Parties from offering their IntelliRouting Express, LocationExpress and DART products, or colorable versions of those products, for sale, and from making, using, or selling the same. The record in the instant case demonstrates that there are known methods for constructing computer databases for telephone routing, none of which use latitude and longitude coordinates in the manner disclosed in the '111 Reissue and the '689 Patent. Therefore, the Court will enjoin the Murex-Targus Parties from using latitude and longitude coordinates in the construction of computer database(s) used to produce and/or support telephone routing products or services. To the extent that the Murex-Targus Parties offer services that are not related to telephone routing or services that have substantial non-infringing uses, the Court finds that such services cannot be enjoined or, if enjoined, would present evidentiary

difficulties better resolved in another forum. Based on these findings, the Court declines to adopt the proposed injunction offered by 800 Adept and will include an injunction in a separate Final Judgment that will issue after this Order.

V. Enhanced Damages

In exceptional cases of patent infringement, a court may increase the damages up to three times. *See* 35 U.S.C. § 284. Because the jury found that the Murex-Targus Parties willfully infringed the asserted claims of 800 Adept's patents, the Court concludes that this is an exceptional case. *See Epcon Gas Sys., Inc. v. Bauer Compressors, Inc.*, 279 F.3d 1022, 1034 (Fed. Cir. 2002).

Enhanced damages are appropriate if the "infringer is guilty of conduct upon which increased damages may be based," and if the "totality of the circumstances" supports an enhanced award. *Jurgens v. CBK, Ltd.*, 80 F.3d 1566, 1570 (*Fed. Cir.* 1996) (citing *Read Corp. v. Portec, Inc.*, 970 F.2d 816, 826-27 (Fed. Cir. 1992)). "In exercising [its] discretion [to award enhanced damages], the trial court considers the weight of the evidence of the infringer's culpability, in light of the factors included in *Read*." *Johns Hopkins Univ. v. CellPro, Inc.*, 152 F.3d 1342, 1365 (Fed. Cir. 1998) (internal citations omitted). The *Read* factors are:

> (1) whether the infringer deliberately copied the ideas or design of another;
>
> (2) whether the infringer, when he knew of the other's patent protection, investigated the scope of the patent and formed a good-faith belief that it was invalid or that it was not infringed; . . .
>
> (3) the infringer's behavior as a party to the litigation[;] . . .
>
> (4) [d]efendant's size and financial condition[;] . . .
>
> (5) [c]loseness of the case[;] . . .
>
> (6) [d]uration of defendant's misconduct[;] . . .
>
> (7) [r]emedial action by the defendant[;] . . .
>
> (8) [d]efendant's motivation for harm[;] . . . [and]
>
> (9) [w]hether defendant attempted to conceal its misconduct.

See 970 F.2d at 827.

Several of the *Read* factors speak to the circumstances of the instant case. The Murex-Targus Parties clearly knew of 800 Adept's patents, and the record shows that they vigorously attacked the validity of those patents both before the Patent Office and during this litigation. They also provided the infringing services for years prior to the entry of the jury verdict and after notice of the infringement. The

evidence adduced at trial also demonstrates that the Murex-Targus Parties aggressively expanded their share of the market during this time using studiously duplicitous business methods to the disadvantage of 800 Adept. In this regard, the willfulness question was not a close one. *See Modine Mfg. Co. v. The Allen Group*, 917 F.2d 538, 543 (Fed.Cir. 1990) (discussing whether the finding of willfulness was "sufficiently close on the evidence."). Also, the evidence shows that 800 Adept, although it was first to market, was a significantly smaller company with a smaller market share than the Murex-Targus Parties. *See St. Regis Paper Co. v. Winchester Carton Corp.*, 410 F. Supp. 1304, 1309 (D. Mass. 1976). The Murex-Targus Parties also appear from the instant record to have the financial wherewithal to absorb the cost of increased damages, if not an award of three times the jury award. The Court, therefore, concludes that the balance of the *Read* factors favors awarding enhanced damages of one and a half times the jury award, i.e., $24,000,000.00, which is an amount sufficient punish the conduct of the Murex-Targus Parties.

VI. Attorneys' Fees

In exceptional cases, a court may also "award reasonable attorney fees to the prevailing party." 35 U.S.C. § 285. "[T]he Court may consider the factors relevant to an enhanced damages award in determining whether attorneys' fees should be granted." *nCUBE Corp. v. SeaChange Int'l, Inc.*, 313 F. Supp. 2d 361, 391 (D. Del. 2004).

For the reasons discussed above, the Court also finds that this is an exceptional case and determines that 800 Adept should be awarded attorneys' fees. 800 Adept is not entitled to fees, however, that arise from the prosecution of any claim(s) that were not brought before the jury. 800 Adept shall, within fourteen (14) days from the date of this Order, file with the Court a separate motion or petition together with the supporting evidence necessary to determine a reasonable and appropriate fee. The Murex-Targus Parties shall respond within ten (10) days thereafter.[12]

VII. Conclusion

Based on the forgoing, the Court **GRANTS IN PART** and **DENIES IN PART** the Motion for Entry Of Final Judgment, An Award Of Prejudgment Interest And A Permanent Injunction (Doc. No. 430) of Plaintiff 800 Adept, Inc. and **GRANTS** 800 Adept's Motion for Attorneys' Fees (Doc. No. 431). More specifically, the Court Rules as follows:

(1) 800 Adept's Motion for Prejudgment Interest is **DENIED;**

(2) 800 Adept's Motion for A Permanent Injunction is **GRANTED IN PART;**

---

[12] This finding is limited to the Murex-Targus Parties, and 800 Adept is not entitled to attorney's fees from West Corporation.

(3) 800 Adept's Motion for Enhanced Damages is **GRANTED,** and the Court awards $24,000,000.00 in enhanced damages to 800 Adept against the Murex-Targus Parties; and

(4) 800 Adept's Motion for Attorneys' Fees is **GRANTED,** and 800 Adept shall, within fourteen (14) days of the day of this Order, file with the Court a separate motion or petition together with such evidence as necessary to determine a reasonable and appropriate fee.

The Court will enter a separate Final Judgment, in accordance with this Order, forthwith. All other pending motions are denied as moot.

DONE and **ORDERED** in Chambers in Orlando, Florida on April 12, 2007.

/s/ Patricia C. Fawsett
PATRICIA C. FAWSETT,
CHIEF JUDGE
UNITED STATES
DISTRICT COURT

Copies furnished to:
Counsel of Record

UNITED STATES DISTRICT COURT
MIDDLE DISTRICT OF FLORIDA
ORLANDO DIVISION

800 ADEPT, INC., and ADEPTEL, INC.,

Plaintiffs/Counter-Defendants,

-vs-

MUREX SECURITIES, LTD., MUREX LICENSING CORPORATION, TARGUS INFORMATION CORPORATION, and WEST CORPORATION,

Defendants/Counter-Plaintiffs.

Case No. 6:02-cv-1354-Orl-19DAB

FINAL JUDGMENT AND ORDER OF INJUNCTIVE RELIEF

(Filed Apr. 12, 2007)

Pursuant to Federal Rule of Civil Procedure 58 and in accordance with the jury verdict delivered on October 30, 2006, and the Court's own findings and conclusions entered on the record in this case, Final Judgment is entered in favor of Plaintiff 800 Adept, Inc. and against Defendants Murex Securities, Ltd., Murex Licensing Corporation, Targus Information Corporation and West Corporation for infringement of claims 1-19, 22-27, 29, 31, and 34-39 of U.S. Patent No. RE36,111.

Final Judgment is entered in favor of Plaintiff 800 Adept, Inc. and against Defendants Murex Securities, Ltd., Murex Licensing Corporation, and Targus Information Corporation for infringement of claims 41, 43, and 46-51 of U.S. Patent No. RE36,111, and for infringement of claims 1, 3, 4, and 5 of U.S. Patent No. 5,805,689.

Final Judgment is entered in favor of Counter-Defendants 800 Adept, Inc. and Adeptel, Inc. and against Counter-Plaintiffs Murex Securities, Ltd., Murex Licensing Corporation, and Targus Information Corporation for non-infringement by Counter-Defendants 800 Adept, Inc. and Adeptel, Inc. of claims 11, 12, and 13 of U.S. Patent No. 4,757,267, claim 69 of Patent No. 5,506,897, claims 1 and 50 of U.S. Patent No. 5,848,131, claim 19 of U.S. Patent No. 5,901,214, claims 1 and 20 of U.S. Patent No. 5,907,608, claims 4 and 13 of U.S. Patent No. 5,910,982, claim 1 of U.S. Patent No. 5,956,397, claim 46 of U.S. Patent No. 5,982,868, claim 25 of U.S. Patent No. 6,058,179, and claim 10 of U.S. Patent No. 6,091,810.

Final Judgment is entered in favor of Counter-Defendants 800 Adept, Inc. and Adeptel, Inc. and against Counter-Plaintiffs Murex Securities, Ltd., Murex Licensing Corporation, and Targus Information Corporation on the issue of invalidity of all claims of Patent No. 5,506,897, all claims of U.S. Patent No. 5,848,131, claim 19 of U.S. Patent No. 5,901,214, claims 1 and 20 of U.S. Patent No. 5,907,608, claims 4 and 13 of U.S. Patent No. 5,910,982, claim 1 of U.S. Patent No. 5,956,397, claim

46 of U.S. Patent No. 5,982,868, claim 25 of U.S. Patent No. 6,058,179, and claim 10 of U.S. Patent No. 6,091,810.

IT IS THEREFORE ORDERED AND ADJUDGED

1. That the Plaintiff/Counter-Defendant, **800 ADEPT, INC.**, shall recover from the Defendants/Counter-Plaintiffs, **MUREX SECURITIES, LTD., MUREX LICENSING CORPORATION**, and **TARGUS INFORMATION CORPORATION**, jointly and severally, the amount of $18,000,000.00 on its claims of patent infringement, plus $24,000,000.00 in enhanced damages, plus $2,000,000.00 in compensatory damages on its claim of tortious interference, plus $5,000,000.00 in punitive damages, for a total amount of $49,000,000.00, for which sum let execution issue.

2. That the Plaintiff/Counter-Defendant, **800 ADEPT, INC.**, shall recover from the Defendant/Counter-Plaintiff, **WEST CORPORATION**, the sum of $48,000.00, for which sum let execution issue.

3. That the Plaintiff/Counter-Defendant, **800 ADEPT, INC.**, shall take nothing on its remaining claims not set forth in this Final Judgment and that such claims be dismissed with prejudice.

4. That the Defendants/Counter-Plaintiffs, **MUREX SECURITIES, LTD., MUREX**

LICENSING CORPORATION, and **TARGUS INFORMATION CORPORATION**, shall take nothing by this action.

IT IS FURTHER ORDER AND ADJUDGED

5. That injunctive relief is granted in favor of Plaintiff, **800 ADEPT, INC.**, and against Defendants, **MUREX SECURITIES, LTD.**, **MUREX LICENSING CORPORATION**, and **TARGUS INFORMATION CORPORATION**.

That the Defendants/Counter-Plaintiffs, **MUREX SECURITIES, LTD.**, **MUREX LICENSING CORPORATION**, and **TARGUS INFORMATION CORPORATION**, are enjoined and shall cease and desist in the making, using, sale, or offering for sale, the IntelliRouting Express, LocationExpress and DART products, and any colorable versions thereof, and shall be further enjoined from using latitude and longitude coordinates in the construction of computer databases used to produce and/or support such products.

Date: April 12, 2007 at 1:19 p.m.

/s/ Patricia C. Fawsett
PATRICIA C. FAWSETT,
CHIEF JUDGE
UNITED STATES
DISTRICT COURT

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

2007-1272,-1356

800 ADEPT, INC.,

Plaintiff-Appellee,

v.

MUREX SECURITIES, LTD., MUREX LICENSING CORPORATION, TARGUS INFORMATION CORPORATION, and WEST CORPORATION,

Defendants-Appellants.

Appeals from the United States District Court for the Middle District of Florida in case no. 6:02-CV-1354, Chief Judge Patricia C. Fawsett.

ORDER

(Filed Oct. 6, 2008)

A combined petition for panel rehearing and for rehearing en banc having been filed by the Appellee, and the petition for rehearing, having been referred to the panel that heard the appeal, and thereafter the petition for rehearing en banc having been referred to the circuit judges who are in regular active service,

UPON CONSIDERATION THEREOF, it is

ORDERED that the petition for panel rehearing be, and the same hereby is, DENIED and it is further

ORDERED that the petition for rehearing en banc be, and the same hereby is, DENIED.

The mandate of the court will issue on October 14, 2008.

FOR THE COURT,

/s/ Jan Horbaly/JB
Jan Horbaly
Clerk

Dated: 10/06/2008

cc: Paul R.Q. Wolfson
Stephen D. Milbrath

800 ADEPT V MUREX SECURITIES, 2007-1272,-1356
(DCT – 6:02-CV-1354)

Fed. R. Civ. P., Rule 50. Judgment as a Matter of Law in a Jury Trial; Related Motion for a New Trial; Conditional Ruling

(a) JUDGMENT AS A MATTER OF LAW.

(1) *In General.* If a party has been fully heard on an issue during a jury trial and the court finds that a reasonable jury would not have a legally sufficient evidentiary basis to find for the party on that issue, the court may:

(A) resolve the issue against the party; and

(B) grant a motion for judgment as a matter of law against the party on a claim or defense that, under the controlling law, can be maintained or defeated only with a favorable finding on that issue.

* * *

Fed. R. Civ. P., Rule 52. Findings and Conclusions by the Court; Judgment on Partial Findings

(a) FINDINGS AND CONCLUSIONS.

(1) *In General.* In an action tried on the facts without a jury or with an advisory jury, the court must find the facts specially and state its conclusions of law separately, . . .

* * *

(6) *Setting Aside the Findings.* Findings of fact, whether based on oral or other evidence, must not be set aside unless clearly erroneous, and the reviewing court must give due regard to the trial court's opportunity to judge the witnesses' credibility.

* * *

UNITED STATES DISTRICT COURT
MIDDLE DISTRICT OF FLORIDA
ORLANDO DIVISION

800 Adept, Inc., and ADEPTEL, INC.

Plaintiffs,

-vs-

MUREX SECURITIES, LTD., MUREX LICENSING CORPORATION, TARGUS INFORMATION CORPORATION, and WEST CORPORATION,

Defendants.

Case No. 6:02-cv-1354-Orl-28DAB

VERDICT FORM

(Filed Oct. 30, 2006)

I. Claims Relating to 800 Adept's Patents

A. Do you find that 800 Adept proved by a preponderance of the evidence:

1. (a) That the Murex-Targus Parties have infringed at least one claim of the 800 Adept patents?

Yes	No
X	

(b) If your answer to 1.(a) is "yes", list the patent(s) and the patent claim(s) infringed:

Patent: 111 Claim(s): 1-19, 22-27, 29, 31, 34-39, 41, 43, 46-51

Patent: 689 Claim(s): 1, 3, 4, 5

1. (a) That West has infringed at least one claim of the 800 Adept patents?

Yes	No
X	

(b) If your answer to 2.(a) is "yes", list the patent(s) and the patent claim(s) infringed:

Patent: 111 Claim(s): 1-19, 22-27 29, 31, 34-39

Patent: Claim(s):

B. Do you find that Defendants have proved by clear and convincing evidence:

1. (a) That at least one claim of the '111 Patent is invalid?

Yes	No
	X

(b) If your answer to 1.(a) is "yes", list the invalid claim(s):

_____

2. (a) That at least one claim of the '689 Patent is invalid?

Yes	No
_____	X

(b) If your answer to 2.(a) is "yes", list the invalid claim(s):

_____

C. If you find a claim infringed in the questions under I.A. and did not find such claim invalid in the questions under I.B., what amount of damages, if any, should be awarded to 800 Adept as to each claim?

Party	Damages
Against the Murex-Targus Parties:	$ 18,000,000.00
Against West:	$ 48,000.00

D. If you find a claim infringed in the questions under I.A. and did not find such claim invalid in the questions under I.B., do you find that 800 Adept proved by clear and convincing evidence that Defendant(s) willfully infringed such claim(s)?

	Yes	No
The Murex-Targus Parties	X	

	Yes	No
West:		X

E. Do you find that Defendants proved by clear and convincing evidence:

1. That the '111 Patent, the '689 Patent, or both are unenforceable due to the conduct of 800 Adept, its agents or employees before the Patent Office?

Yes	No
	X

2. If your answer to E.1. is "yes", list the unenforceable patent(s):

_____

II. Claims Related to Targus' Patents

A. Do you find that Targus proved by a preponderance of the evidence:

1. (a) That the 800 Adept Parties have infringed at least one claim of the Shafer-Moore patents?

Yes	No
	X

(b) If your answer to 1.(a) is "yes", list the patent(s) and the patent claim(s) infringed:

Patent: ____ Claim(s): _____

Patent: ____ Claim(s): _____

Patent: ____ Claim(s): _____

Patent: ____ Claim(s): _____

Patent: ____ Claim(s): _____

Patent: ____ Claim(s): _____

Patent: ____ Claim(s): _____

Patent: ____ Claim(s): _____

Patent: ____ Claim(s): _____

B. Do you find that the 800 Adept Parties have proved by clear and convincing evidence:

1. (a) That at least one claim of the '897 Patent is invalid?

Yes	No
X	

(b) If your answer to 1.(a) is "yes", list the invalid claim(s):

All Claims

2. (a) That at least one claim of the '131 Patent is invalid?

Yes	No
X	

(b) If your answer to 2.(a) is "yes", list the invalid claim(s):

All Claims

3. (a) That at least one claim of the '214 Patent is invalid?

Yes	No
X	

(b) If your answer to 3.(a) is "yes", list the invalid claim(s):

19

4. (a) That at least one claim of the '608 Patent is invalid?

Yes	No
X	

(b) If your answer to 4.(a) is "yes", list the invalid claim(s):

1, 20

5. (a) That at least one claim of the '982 Patent is invalid?

Yes	No
X	

(b) If your answer to 5.(a) is "yes", list the invalid claim(s):

4, 13

6. (a) That at least one claim of the '397 Patent is invalid?

Yes	No
X	

(b) If your answer to 6.(a) is "yes", list the invalid claim(s):

1

7. (a) That at least one claim of the '868 Patent is invalid?

Yes	No
X	

(b) If your answer to 7.(a) is "yes", list the invalid claim(s):

46

8. (a) That at least one claim of the '179 Patent is invalid?

Yes	No
X	

(b) If your answer to 8.(a) is "yes", list the invalid claim(s):

25

9. (a) That at least one claim of the '810 Patent is invalid?

Yes	No
X	

(b) If your answer to 9.(a) is "yes", list the invalid claim(s):

10

C. If you find a claim infringed in the questions under II.A. and did not find such claim invalid in the questions under II.B., what amount of damages, if any, should be awarded to Targus as to each claim?

Party	Damages
Against 800 Adept Parties:	$ 0

D. If you find a claim infringed in the questions under II.A. and did not find such claim invalid in the questions under II.B., do you find that Targus proved by clear and convincing evidence that the 800 Adept Parties willfully infringed such claim(s)?

	Yes	No
The 800 Adept Parties		X

III. Claims Relating To The Riskin Patent

A. Do you find that 800 Adept proved by a preponderance of the evidence that they did not infringe the following claims of the U.S. Patent Number 4,757,267 (the "Riskin" Patent")?

	Yes	No
1. Claim 11:	X	
2. Claim 34:	X	

IV. 800 Adept's Tortious Interference Claim

A. Do you find that 800 Adept has proved by a preponderance of the evidence that Targus tortiously interfered with the business relationship(s) between 800 Adept and its customer(s)?

Yes	No
X	

(If your answer to question IV.A. is "no", please do not answer question IV.B.)

B. 1. Do you find that 800 Adept proved by clear and convincing evidence both elements of its claim that the Murex-Targus Parties acted in bad faith when they tortiously interfered with a business relationship(s) between 800 Adept and its customer(s)?

Yes	No
X	

(If your answer to question IV.B.1. is "no", then do not answer question IV.B.2. If your answer to question IV.B.1. is "yes", please answer question IV.B.2.)

2. (a) What compensatory damages for tortious interference with the business relationship(s) should be awarded to 800 Adept against Targus?

$2,000,000.00

2. (b) If you award compensatory damages in question 2.(a), the jury may, but is not required to, award punitive damages if 800 Adept proves by clear and convincing evidence that it is entitled to such punitive damages. What amount of punitive damages, if any, should be awarded to 800 Adept against Targus?

$5,000,000.00

SO SAY WE ALL.

/s/ Ann P. Brown
Foreperson

Dated: 10/30/06

TARINFO.002FRX PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Under Re-Exam	: 5,506,897	) Group Art Unit 2645
Appl. No.	: 90/005,542	)
Filed	: 10/29/99	)
For	: AUTOMATIC ROUTING SYSTEM FOR TELEPHONIC SERVICES	)
Examiner	: S. Weaver	)

RESPONSE TO OFFICE ACTION IN REEXAMINATION

Assistant Commissioner for Patents
Washington, D.C. 20231

* * *

The Moore/Shaffer patent has two categories of independent claims: "two-table" claims (1, 20, 32, 58, 62, 67, 69, and 80) and claims related to generating "client tables" (50, 72, and 83). Fig. 1B illustrates a two-table embodiment, with detailed description found from col. 8, line 13 to col. 13, line 42. Figs. 1A and 3-21 illustrates various client table embodiments, with detailed description found from col. 13, line 45 to col. 28, line 5.

Each of the two-table claims includes limitations directed to some kind of master table (or file or database) that is dynamically linked to a client table (or file or database) during call routing. No such system or method is disclosed or suggested by Neville's pre-built, single-table system. Each of the client table claims similarly includes limitations related to generating or linking a client table which is neither disclosed nor suggested by Neville's pre-built, single-table system.

* * *

TARINFO.2FWCP1 PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	: Shaffer, et al.	) Group Art Unit 2614
Appl. No.	: 08/598,392	)
Filed	: February 8, 1996	)
For	: **AUTOMATIC INFORMATION AND ROUTING SYSTEM FOR TELEPHONIC SERVICES**	)
Examiner	: Unknown	)

DECLARATION OF JAMES D. SHAFFER

* * *

14. Targus subsequently contracted with FedEx on August 22, 1994, to engineer a drop-box locator system for the purpose of pilot testing the locator system. The purpose of implementing the pilot drop-box locator testing was to determine whether such a drop-box locator would work for its intended purpose. Targus signed a consulting contract with FedEx to control the drop-box locator test using ATI as a subcontractor and guaranteeing that: Targus would pay ATI for network, routing and voice response unit ("VRU") costs, even if FedEx was not satisfied and would not pay Targus; Targus would turn the entire project over to ATI if the test was successful and

FedEx committed to a national roll-out of the drop-box locator service; and Targus would have an operational prototype of the system running at the ATI Jacksonville facility within FedEx's required time frame. A cover letter, dated August 23, 1994, for the consulting agreement from FedEx to George Moore (one of the named inventors and a Targus officer) is attached hereto as Exhibit B. . . .

* * *

25. A subsequent pilot testing phase was started in late February 1995 for a FedEx center in Sacramento, California. This pilot test phase was more rigorous than the first phase in that it involved both manned and unmanned FedEx locations. The pilot test was continued until July 1995 when it was abandoned by FedEx due to changes in management and the inability of ATI and FedEx to agree to a post-testing contract. . . .

* * *

34. As was described above, Targus and ATI executed Non-Disclosure and License agreements which provided for protection of the invention and for joint cooperation in testing and servicing the DART system. Although there was no written secrecy agreement requiring FedEx to protect the intellectual property of Targus, there was at least an implied expectation of confidentiality by FedEx with respect to any information they may have received as to the internal structure, processes and techniques of the DART system. . . .

* * *

35. In summary, the DART system that was installed at the ATI processing facility in Jacksonville prior to February 6, 1995 was used for pilot testing. Pilot testing continued through July 1995 when the DART project was abandoned by FedEx. At no time was the DART system ever fully operational.

* * *

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant :	Shaffer, et al.	) Group Art Unit
Appl. No. :	Unknown	) 2742
Filed :	Herewith	) I hereby certify that this correspondence and all marked attachments are being deposited with the United States Postal Service as first-class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231, on
For :	**AUTOMATIC ROUTING AND INFORMATION SYSTEM FOR TELEPHONIC SERVICES**	) June 19, 1998 (Date)
Examiner:	Unknown	) /s/ R.E. Campbell Richard E. Campbell, Reg. No. 34,790

PRELIMINARY STATEMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

* * *

Applicant's specification has a detailed description of the automated process of building telephone number to service location telephone number tables

at pages 66-73 of the specification, with additional support of the automated process of building the underlying client table at pages 39-65. In contrast, the Neville reference mentions, in high-level terms, several steps in building the database to be stored at the network control point (NCP) 5A (Figure 1). Nowhere does Neville state that the steps are done automatically or are all done by a computerized process. In fact, portions of the steps are done manually (see Col. 7, line 10). The specification, at Col. 7, lines 10-11, mentions that the alternative to doing the step manually is "with a Geographic Information System (GIS)", which identifies a "tool" but not how it is utilized and how the process is automated. The drawings in the Neville reference also do not show an automated process for building the telephone number to service location telephone number tables. Applicant's experience in developing his automated processes has shown that it is not an easy or trivial undertaking, but instead required much experimentation. The Neville reference does not show the details of an automated process for building telephone number to service location telephone number tables and the underlying client tables as described in detail in Applicant's specification and illustrated in the drawings, and as claimed by Applicant in new Claims 13, 14, and 20.

* * *

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	: Daniel E. Neville	) Group Art Unit) 2742
Appl. No.	: 08/861,174	)
Filed	: May 21, 1997	)
For	: **GEOGRAPHICALLY MAPPED TELEPHONE ROUTING METHOD AND SYSTEM**	)))))))))
Examiner	: Wolinsky	)

PROTEST UNDER C.F.R. §1.291

Assistant Commissioner for Patents
Washington, D.C. 20231

* * *

I. The Reissue Declaration is Misleading

Protestor is deeply troubled by Applicant's apparent attempt to argue that the specification provides support for the currently pending claims as set forth in the reissue declaration. Protestor requests that the Patent Office carefully evaluate each assertion of support contained in that declaration. Protestor submits that the declaration is a concoction of half truths, misstatements, and exaggerations. The declaration mischaracterizes the scope of the claims and

greatly exaggerates the scope of the disclosure in the application.

For example, when discussing support in the specification for newly added Claim 17, paragraph number 1 of the reissue declaration states: "The assignment of a latitude and longitude to a physical location as defined by the street address, ZIP Plus 4 Code, ZIP Code or city was disclosed in the specification of the original patent in Column 6, line 55 through Column 7, line 17 and by example elsewhere . . . " However, newly added Claim 17 claims "*means for allocating* latitude and longitude coordinates to the physical location of all potential first parties." What the specification states at Column 6, lines 55-57 is: "With the exception of cellular (mobile) telephones, every NPA-NXX-XXXX has an [sic] stationary address associated with it, and therefore a vertical and horizontal coordinate." The specification does not disclose any apparatus for allocating latitude and longitude coordinates to the physical location of all potential first parties. At most, the specification states that phone numbers have stationary addresses associated with them. The specification does not describe any relationship between the address associated with the phone number and the physical location of a first party.

One further example of the misstatements contained in the reissue declaration is contained in paragraph four of the reissue declaration. In that paragraph, Applicant asserts that the method of constructing a database set forth in reissue Claim 39

is "*specifically* disclosed in the patent specification commencing in column 10, line 33 and continuing into column 11." (Emphasis added). Reissue Claim 39 *specifically* claims "a method of constructing a database" which includes the step of "assigning individual latitude and longitude coordinates to the physical location of all potential first parties." Nowhere in the cited portion of the specification is there explained or described a way to assign latitude or longitude coordinates to the physical location of all potential first parties.

Protestor submits that in view of the foregoing examples, it is apparent that the reissue declaration misstates the scope of the claims and exaggerates the breadth and scope of the disclosure.

* * *

Serial Number: 08/861,174

Art Unit: 2742

Consideration of Protester's Arguments

1. The Protest under 37 C.F.R. §1.291 filed on 2-23-98 has been carefully considered by the Examiner.

With respect to the Protester's argument that "the specification does not disclose any apparatus for allocating latitude and longitude coordinates to the physical location of all potential parties", applicant's apparatus is illustrated as Network Control Point (NCP) 5A (see FIG. 1) which contains a database (the claimed invention) as clearly disclosed on page 11, lines 11-16; page 15, lines 5-12; page 22, line 5 through page 23, line 11; and page 27, line 15 through page 28, line 11 of applicant's original specification which would be clearly understood by one of ordinary skill in the art. The above mentioned portions of applicant's original specification have also been determined by the Examiner to be sufficient to support the claim language of claims 17-52 of applicant's Reissue application.

With respect to the Protester's argument that "nowhere in the cited portion of the specification is there explained or described a way to assign latitude or longitude coordinates of all potential first parties," the Examiner is of the opinion that applicant's disclosure on page 11, lines 11-16; page 15, lines 5-12; page 22, line 5 through page 23, line 11; and page 27, line 15 through page 28, line 11 is sufficient for one of ordinary skill in the art to understand and-build/use the claimed invention by preassigning, in applicant's

disclosed database 5A, respective latitude and longitude coordinates to the telephone numbers of potential callers and correlating the coordinates to respective telephone numbers of service providers (i.e., advertisers).

With respect to the Protester's numerous other arguments that the claims fail to comply with the requirements of 35 U.S.C. §112, the Examiner is of the opinion that the disclosure adequately describes the claimed invention, that there is enablement of the claimed invention, and that the claims would be clearly understood by one of ordinary skill in the art.

2. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott Wolinsky whose telephone number is (703) 308-6731. The examiner can normally be reached on Tuesday-Friday from 6:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Krista Zele, can be reached on (703) 305-4701.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 305-3900.

/s/ Scott Wolinsky
Scott Wolinsky
Primary Patent Examiner
Art Unit 2742

UNITED STATES DISTRICT COURT
MIDDLE DISTRICT OF FLORIDA
ORLANDO DIVISION

800 ADEPT, INC., a Florida corporation,

Plaintiff,

v.

MUREX SECURITIES, LTD., an Isle of Man limited company; MUREX LICENSING CORPORATION, a Delaware corporation; TARGUS INFORMATION CORPORATION, a corporation; and WEST CORPORATION, a corporation,

Defendants.

Case No. 6:02-cv-1354-Orl-28-DAB

MUREX SECURITIES, LTD., an Isle of Man limited company; and MUREX LICENSING CORPORATION, a Delaware corporation,

Counter-plaintiffs,

v.

800 ADEPT, INC., a Florida corporation, ADEPTEL, INC., a Florida corporation, ARCH TELECOM, INC., a Texas corporation, VAIL SYSTEMS, INC., an Illinois corporation,

Counter-defendants.

SECOND AMENDED COUNTERCLAIMS AND COMPLAINT OF MUREX SECURITIES, LTD. AND MUREX LICENSING CORPORATION.
INJUNCTIVE RELIEF AND JURY TRIAL REQUESTED

(Filed July 17, 2003)

* * *

6. Upon information and belief, Vail Systems, Inc. ("Vail") is an Illinois corporation with offices in Deerfield, Illinois and is a customer of 800 Adept. Vail's website states that Vail provides a platform that "automatically recognizes the number from which a call is made, identifies the caller's location using a nationwide geo-locate database . . . and then instantly routes the call to the nearest authorized service provider." Upon information and belief, Vail does business in Florida, among other places.

* * *

11. This Court has personal jurisdiction over Vail because it conducts, transacts and/or solicits business within Florida. In addition, this Court has personal jurisdiction over Vail because it has committed and continues to commit acts of infringement of one or more claims of one or more of the Murex Patents within Florida.

* * *

22. Vail manufactures, operates, sells, and/or offers to sell a range of telecommunications products

and services. According to Vail's website, these products and services include call routing services. MSL and MLC are further informed that Vail uses, operates, sells, or offers for sale call routing systems and services using one or more databases provided by 800 Adept. Vail's services and systems are intended and are available for use by consumers and businesses located throughout the United States, including within the Middle District of Florida.

* * *

31. Upon information and belief, Vail directly infringes, contributes to the infringement of, and/or induces others to infringe one or more claims of one or more of the '267 Patent through at least the act of operating and using methods and apparatuses in the United States that connect customers to suppliers of goods. Vail continues to directly infringe, contribute to the infringement of, and/or induce others to infringe the '267 Patent.

* * *

33. MSL and MLC have been, and will continue to be, damaged and irreparably harmed by 800 Adept's, Adeptel's, Arch Telecom's and Vail's infringements, which will continue unless 800 Adept, Adeptel, Arch Telecom, and Vail are enjoined by this Court.

* * *

61. Upon information and belief, Vail directly infringes, contributes to the infringement of, and/or

induces others to infringe one or more claims of the '608 Patent through at least the act of operating and using methods and apparatuses in the United States that automatically route telephone calls across a telephone network. Vail continues to directly infringe, contribute to the infringement of, and/or induce others to infringe the '608 Patent.

* * *

70. Upon information and belief, Vail directly infringes, contributes to the infringement of and/or induces others to infringe one or more claims of the '982 Patent through at least the act of operating and using methods and apparatuses in the United States that automatically route telephone calls across a telephone network and optionally provide information about a service location. Vail continues to directly infringe, contribute to the infringement of, and/or induce others to infringe the '982 Patent.

* * *

79. Upon information and belief, Vail directly infringes, contributes to the infringement of, and/or induces others to infringe one or more claims of the '397 Patent through at least the act of operating and using methods and apparatuses in the United States that automatically route telephone calls across a telephone network and optionally provide information about a service location. Vail continues to directly infringe, contribute to the infringement of, and/or induce others to infringe the '397 Patent.

* * *

81. MSL and MLC have been, and will continue to be, damaged and irreparably harmed by 800 Adept's, Adeptel's, Arch Telecom's and Vail's infringements, which will continue unless 800 Adept, Adeptel, Arch Telecom, and Vail are enjoined by this Court.

* * *

95. Upon information and belief, Vail also directly infringes, contributes to the infringement of, and/or induces others to infringe one or more claims of the '179 Patent through at least the act of operating and using methods and apparatuses in the United States that automatically route telephone calls across a telephone network and optionally provide information about a service location. Vail continues to directly infringe, contribute to the infringement of, and/or induce others to infringe the '179 Patent.

* * *

97. MSL and MLC have been, and will continue to be, damaged and irreparably harmed by 800 Adept's, Adeptel's, Arch Telecom's and Vail's infringements, which will continue unless 800 Adept, Adeptel, Arch Telecom, and Vail are enjoined by this Court.

* * *

104. Upon information and belief, Vail directly infringes, contributes to the infringement of, and/or induces others to infringe one or more claims of the '810 Patent through at least the act of operating and

using methods and apparatuses in the United States that automatically route telephone calls across a telephone network and/or provide information about a service location. Vail continues to directly infringe, contribute to the infringement of, and/or induce others to infringe the '810 Patent.

* * *

106. MSL and MLC have been, and will continue to be, damaged and irreparably harmed by 800 Adept's, Adeptel's, Arch Telecom's and Vail's infringements, which will continue unless 800 Adept, Adeptel, Arch Telecom, and Vail are enjoined by this Court.

PRAYER FOR RELIEF

Defendants and Counterclaimants, Murex Securities, Ltd. and Murex Licensing Corporation, request the following relief:

* * *

j. An accounting for damages resulting from Vail's infringement of the '267, '608, '397, '982, '179, and '810 Patents owned by MSL and/or MLC, together with pre-judgment and post-judgment interest, is necessary;

* * *

n. A permanent injunction against Vail, and its officers, agents. servants, employees, attorneys, parent and subsidiary corporations, assigns and successors in interest, and those persons in active

concert or participation with them, enjoining them from continued acts of infringement of the '267, '608, '397, '982, '179, and '810 Patents owned by MSL and/or MLC;

* * *

U.S. District Court
Middle District of Florida (Orlando)
CIVIL DOCKET FOR CASE #:
6:02-cv-01354-PCF-DAB

800 Adept, Inc. v. Murex Securities LTD, et al
Assigned to:
Chief Judge Patricia C. Fawsett
Referred to:
Magistrate Judge David A. Baker
Demand: $0
Cause:
35:271 Patent Infringement

Date Filed:
11/13/2002
Jury Demand:
Both
Nature of Suit:
830 Patent
Jurisdiction:
Federal Question

Date Filed	#	Docket Text
11/13/2002	1	VERIFIED COMPLAINT for Patent Infringement, Declaratory Judgment of Non-Infringement and Invalidity and Tortious Interference with Contractual Relations with Demand for Jury Trial Filed. Filing fee $150.00 Receipt # 10052. (hsh) (Entered: 11/14/2002)
11/13/2002		MAGISTRATE JUDGE CASE ASSIGNMENT Magistrate assigned: David A. Baker. (hsh) (Entered: 11/14/2002)
11/13/2002		SUMMONS issued for Murex Securities LTD, Murex Licensing Corp, Targus Information. (hsh) (Entered: 11/14/2002)
11/21/2002	2	RELATED CASE ORDER AND NOTICE of designation under Local

		Rule 3.05 – TRACK 2 (response due 11 days). (ctc) (hsh) (Entered: 11/21/2002)
11/21/2002	3	ORDER on Interested Persons and Corporate Disclosure (response due 11 days) ctc (hsh) (Entered: 11/21/2002)
11/26/2002	4	AMENDED COMPLAINT – Action for Infringement of Plaintiff's Patents; for Judgment on Non-Infringement and/or Invalidity as to Defendants' Patents; and for Unfair Competition by 800 Adept, Inc. Amending [1-1] Complaint: adding West Corporation; Terminating defendant XYZ Corporations, defendant John Does. Jury Trial and Injunctive Relief Requested. (hsh) (Entered: 11/27/2002)
11/26/2002		SUMMONS issued for West Corporation. (hsh) (Entered: 11/27/2002)
12/11/2002	5	NOTICE of attorney appearance for 800 Adept, Inc. by Herbert L. Allen, Brian R. Gilchrist. (hsh) (Entered: 12/12/2002)
12/11/2002	6	NOTICE by 800 Adept, Inc. of pendency of other actions re: order of compliance to local rule – case is related to USDC Eastern District of Virginia, Norfold Division, Civil Action no. 2:02cv865. (hsh) (Entered: 12/12/2002)

12/11/2002	7	CERTIFICATE OF INTERESTED PERSONS AND CORPORATE DISCLOSURE STATEMENT by 800 Adept, Inc. Re: [3-1] order. (hsh) (Entered: 12/12/2002)
12/12/2002	8	MOTION by Murex Securities LTD, Murex Licensing Corp, Targus Information with memorandum in support for Donald E. Knebel, Todd G. Vare and James R. Sweeney, II, to appear pro hac vice; referred to Magistrate Judge David A. Baker (hsh) (Entered: 12/16/2002)
03/31/2003	32	CASE MANAGEMENT REPORT (hsh) (Entered: 04/01/2003)
04/02/2003	33	ORDER: Granting [30-1] motion to withdraw their combined motions to dismiss all counts against Murex Securities and Murex Licensing for lack of personal jurisdiction and to transfer venue to the Eastern District of VA; Denying as moot [9-1] motion to Dismiss all Counts against Murex Securities and Murex Licensing for Lack of Personal Jurisdiction; Denying as moot [9-2] motion Transfer Venue to the Eastern District of Virginia. (Signed by Judge John Antoon II 4/1/03) ctc (hsh) (Entered: 04/03/2003)

04/03/2003 34 NOTICE of withdrawal of notice of joinder filed on 12/30/02 by West Corporation (igc) (Entered: 04/04/2003)

04/16/2003 35 CASE MANAGEMENT AND SCHEDULING ORDER setting Joining of parties, amending of pleadings 5/21/03; Discovery 5/7/04; Dispositive motion deadline 6/1/04; Pretrial statement due 9/3/04; Jury trial set for the trial term beginning 8:30 a.m. on 11/1/04 Scheduled before Judge John Antoon II. (signed by Judge John Antoon II) ctc (hsh) (Entered: 04/17/2003)

04/16/2003 35 ORDER referring case to mediation. Appointing Jay M. Cohen as mediator. Conduct hearing by JUNE 21, 2004. Lead counsel, Stephen D. Milbrath, to coordinate dates. (Signed by Judge John Antoon II) ctc (hsh) (Entered: 04/17/2003)

04/24/2003 36 ANSWER by 800 Adept, Inc. to [31-2] counter claim. (hsh) (Entered: 04/25/2003)

05/12/2003 37 MOTION by Murex Securities LTD, Murex Licensing Corp, Targus Information with memorandum in support for Jeff M. Barron to appear pro hac vice; referred to Magistrate Judge David A. Baker. (hsh) (Entered: 05/13/2003)

05/19/2003 38 ORDER granting [37-1] motion for Jeff M. Barron to appear pro hac vice.

(Signed by Magistrate Judge David A. Baker) ctc (maa) (Entered: 05/19/2003)

05/21/2003 39 MOTION by Murex Securities LTD, Murex Licensing Corp for leave to file amended counterclaims and complaint and join additional defendants. (hsh) (Entered: 05/22/2003)

05/21/2003 40 MEMORANDUM by Murex Securities LTD, Murex Licensing Corp in support of [39-1] motion for leave to file amended counterclaims and complaint and join additional defendants. (hsh) (Entered: 05/22/2003)

06/02/2003 41 UNOPPOSED MOTION by 800 Adept, Inc. for a 2 day extension of time to submit brief opposing motion for leave to amend counterclaims and complaint and join additional defendants (unopposed); referred to Magistrate Judge David A. Baker, (hsh) (Entered: 06/03/2003)

06/02/2003 END VOLUME 2 (Doc. No. 11-40); BEGIN VOLUME 3 (Doc. No. 41). (hsh) Modified on 06/13/2003 (Entered: 06/13/2003)

06/04/2003 42 ORDER: Granting [41-1] unopposed motion for a 2 day extension of time to submit brief opposing motion for leave to amend counterclaims and complaint and join additional defendants. (Signed by Magistrate Judge David A. Baker) ctc (hsh) (Entered: 06/04/2003)

06/04/2003 43 PLAINTIFF'S MEMORANDUM by 800 Adept, Inc. in opposition to [39-1] motion for leave to file amended counterclaims and and join additional defendants. (hsh) (Entered: 06/05/2003)

06/11/2003 44 COMBINED MOTION by Murex Securities LTD, Murex Licensing Corp with memorandum in support for leave to file a reply brief in support of their motion to amend (brief attached). (hsh) Modified on 06/13/2003 (Entered: 06/12/2003)

06/13/2003 45 MEMORANDUM by 800 Adept, Inc. in opposition to [44-1] motion for leave to file a reply brief in support of their motion to amend (brief attached). (hsh) (Entered: 06/16/2003)

06/30/2003 46 ORDER: Granting [44-1] motion for leave to file a reply brief in support of their motion to amend. (Signed by Judge John Antoon II 6/26/03) ctc (hsh) (Entered: 07/01/2003)

07/01/2003 47 ORDER: Granting [39-1] motion for leave to file amended counterclaims and complaint and join additional defendants. (Signed by Judge John Antoon II) ctc (hsh) (Entered: 07/02/2003)

07/01/2003 48 AMENDED COUNTERCLAIM by Murex Securities LTD, Murex Licensing Corp against 800 Adept, Inc. amending [31-2] counter claim. (hsh) (Entered: 07/02/2003)

07/01/2003	48	THIRD-PARTY COMPLAINT by Murex Securities LTD, Murex Licensing Corp against Adeptel, Inc., Arch Telecom, Inc., Vail Systems, Inc. (hsh) (Entered: 07/16/2003)
07/15/2003	49	ANSWER by 800 Adept, Inc. to [48-1] amended counterclaim. (hsh) (Entered: 07/16/2003)
07/15/2003	49	ANSWER by Adeptel, Inc. to [48-1] third-party complaint. (hsh) (Entered: 07/16/2003)
07/16/2003		SUMMONS issued for 800 Adept, Inc., Adeptel, Inc., Arch Telecom, Inc., Vail Systems, Inc. (hsh) (Entered: 07/17/2003)
07/17/2003	50	NOTICE of Filing second amended counterclaims and complaint by Murex Securities LTD, Murex Licensing Corp. (hsh) (Entered: 07/17/2003)
07/17/2003	51	AMENDED COUNTERCLAIM by Murex Securities LTD, Murex Licensing Corp amending [48-1] amended claim. (maa) (Entered: 07/18/2003)
07/21/2003	52	NOTICE of Filing Acceptance of Service by Murex Securities LTD. (hsh) (Entered: 07/22/2003)
07/21/2003	53	WAIVER OF SERVICE (ACCEPTANCE OF SERVICE) returned executed as to 800 Adept, Inc. (hsh) (Entered: 07/22/2003)
07/21/2003	54	WAIVER OF SERVICE (ACCEPTANCE OF SERVICE) returned

executed as to Adeptel, Inc. (hsh) (Entered: 07/22/2003)

07/29/2003 55 NOTICE of filing acceptance of service by Murex Securities LTD, Murex Licensing Corp, Targus Information (igc) (Entered: 07/30/2003)

07/29/2003 56 RETURN of service executed as to Arch Telecom, Inc. on 7/21/03; Answer due on 8/11/03 for Arch Telecom, Inc. (igc) (Entered: 07/30/2003)

08/12/2003 57 NOTICE of filing acceptance of service by Vail Systems, Inc. (igc) (Entered: 08/13/2003)

08/12/2003 58 WAIVER OF SERVICE returned executed as to Vail Systems, Inc. on 7/31/03; Answer due on 9/29/03 for Vail Systems, Inc. (igc) (Entered: 08/13/2003)

08/13/2003 59 UNOPPOSED MOTION by Arch Telecom, Inc. to extend time to respond to the third party complaint through August 22, 2003 (unopposed); referred to Magistrate Judge David A. Baker. (hsh) (Entered: 08/14/2003)

08/15/2003 60 ORDER: Granting [59-1] consent motion to extend time to respond to the third party complaint through August 22, 2003. (Signed by Magistrate Judge David A. Baker) etc (hsh) (Entered: 08/15/2003)

08/15/2003		DEADLINE updated; set answer due for 8/22/03 for Arch Telecom, Inc. (hsh) (Entered: 08/15/2003)
08/16/2003		VOLUME 3 ENDS (Documents 41-60)/VOLUME 4 BEGINS (maa) (Entered: 08/19/2003)
08/18/2003	61	MOTION by 800 Adept, Inc. for Markman rulings and for summary judgment on Riskin Patent. (maa) (Entered: 08/19/2003)
08/18/2003	62	MEMORANDUM by 800 Adept, Inc. in support of [61-1] motion for Markman rulings, [61-2] motion for summary judgment on Riskin Patent. (maa) (Entered: 08/19/2003)
08/18/2003	63	STATEMENT OF UNDISPUTED FACTS by 800 Adept, Inc. in support of [61-1] motion for Markman rulings, [61-2] motion for summary judgment on Riskin Patent. (maa) (Entered: 08/19/2003)
08/18/2003	64	APPENDIX by 800 Adept, Inc. to [61-1] motion for Markman rulings, [61-2] motion for summary judgment on Riskin Patent. (maa) (Entered: 08/19/2003)
08/13/2003		END VOLUME 4 (Doc. 61-64); BEGIN VOLUME 5 (Doc. No. 65). (hsh) (Entered: 09/04/2003)

* * *

BARNES & THORNBURG LLP

[Address Omitted In Printing]

August 1, 2005

(Filed May 19, 2006)

Via Facsimile and U.S. Mail

Brian Gilchrist, Esq.
Allen, Dyer, Doppelt, Milbrath & Gilchrist, P.A.
255 South Orange Avenue, Ste. 1401
P.O. Box 3791
Orlando, FL 32802-1401

Re: *800 Adept, Inc. v. Murex Securities, Ltd., et al.*

Dear Brian:

I write pursuant to the agreement among the parties reflected in my letter dated July 28 to Stephen Luther. Subject to and limited by (a) your client's representations to date regarding its current products and services (the "Current 800 Adept Products") and (b) the claim construction entered by the Court on May 27, 2005, Murex Licensing Corporation ("MLC") will not assert that the Current 800 Adept Products infringe claims 11 and 34 of the Riskin Patent.

Please be advised that MLC may appeal the Court's May 27 order, and that the foregoing paragraph is conditional upon that right of appeal MLC also reserves the right to assert (or re-assert) infringement of the Riskin patent by the Current 800 Adept Products should the Court's May 27 order be

modified in any way, whether on appeal or otherwise. MLC further reserves the right to assert that any other product or service infringes the Riskin patent (as construed in the May 27 order or otherwise), including, without limitation, to assert infringement by any: new or different 800 Adept products or services; modified or allegedly modified Current 800 Adept Products; products or services made, used, offered for sale, or sold by any person or entity other than 800 Adept (including, without limitation, Adeptel or any 800 Adept owner or employee); products or services that may incorporate or use any Current 800 Adept Products; and/or Current 800 Adept Products that do not conform to your client's representations and/or of which MLC is unaware.

Sincerely,

Original Signed by
/s/ Jeff M. Barron
Jeff M. Barron

cc: Stephen D. Milbrath, Esq
Stephen Luther, Esq.
Suzanne Barto Hill, Esq.
Donald E. Knebel, Esq.
Todd G Vare, Esq.

UNITED STATES DISTRICT COURT
MIDDLE DISTRICT OF FLORIDA
ORLANDO DIVISION

CASE NO: 6:02-CV-1354-ORL-28DAB

800 ADEPT, INC., a Florida corporation,

PLAINTIFF,

VS.

MUREX SECURITIES, LTD.,
MUREX LICENSING CORPORATION,
TARGUS INFORMATION CORPORATION,
and WEST CORPORATION,

DEFENDANTS.

MONDAY, SEPTEMBER 18, 2006
CIVIL JURY TRIAL – DAY 1
BEFORE THE HONORABLE
PATRICIA C. FAWSETT, AND A JURY
CHIEF UNITED STATES DISTRICT JUDGE
ORLANDO, FLORIDA

---

* * *

[179] OPENING STATEMENT

MR. KNEBEL: Thank you, Your Honor.

* * *

[180] Now, because these inventions are different, it will be clear that Targus can't infringe, because it's not doing what Mr. Neville said. Specifically, since

1998, Targus has used what we'll talk about later as real-time processing. And Mr. Neville and Mr. Sierra and their patent lawyer, who will be here, Mr. Livingston, told the Patent Office repeatedly that real-time processing had nothing to do with their invention.

* * *

UNITED STATES DISTRICT COURT
MIDDLE DISTRICT OF FLORIDA
ORLANDO DIVISION

CASE NO: 6:02-CV-1354-ORL-19DAB

800 ADEPT, INC., a Florida corporation,

PLAINTIFF,

VS.

MUREX SECURITIES, LTD.,
MUREX LICENSING CORPORATION,
TARGUS INFORMATION CORPORATION,
and WEST CORPORATION,

DEFENDANTS.

THURSDAY, OCTOBER 5, 2006
CIVIL JURY TRIAL – DAY 10
BEFORE THE HONORABLE
PATRICIA C. FAWSETT CHIEF UNITED
STATES DISTRICT JUDGE, AND A JURY
ORLANDO, FLORIDA

---

* * *

[14] THE COURT: So, who is going to prove infringement of the Riskin patent for the defendant?

MR. VARE: We think Ms. Wong has proved it. We don't need an – that's my point. We don't need an expert to stand up and give an opinion. Dr. O'Kelly has substantive discussions, as well as Dr. Bohacek

about Riskin, what it means, what the scope of the claims are, what the scope of the disclosures are.

The point is that as we began learning more and more after the close of expert discovery, after the reports were already submitted, that led to my e-mail in May of 2006. And that led to the statement we made in our summary judgment briefing that we were starting to learn more and more about this issue. And we felt we could prove it at trial with their witnesses and their documents, and that's what we're trying to do.

* * *

UNITED STATES DISTRICT COURT
MIDDLE DISTRICT OF FLORIDA
ORLANDO DIVISION

CASE NO: 6:02-CV-1354-ORL-28DAB

800 ADEPT, INC., a Florida Corporation,

PLAINTIFF,

VS.

MUREX SECURITIES, LTD.,
MUREX LICENSING CORPORATION,
TARGUS INFORMATION CORPORATION,
and WEST CORPORATION,

DEFENDANTS.

FRIDAY, OCTOBER 20, 2006
CIVIL JURY TRIAL – DAY 19
BEFORE THE HONORABLE
PATRICIA C. FAWSETT, AND A JURY
CHIEF UNITED STATES DISTRICT JUDGE
ORLANDO, FLORIDA

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[250] THE COURT: Well, here is what I want to ask you. Why does this interpretation, assigning is used in, I think I said element three or step three of the claims of those two patents, refers to a designation made prior to the telephone call of the first parties. Why would that not refer to both a static and an automatic?

MR. MILBRATH: Exactly my argument. It does. Even the examiner told them that about the Neville patent in their own patent prosecutions.

THE COURT: But my point is not what you want. My point is that you can argue that –

MR. MILBRATH: But I have a feeling the defense is going to get up there and say, a-ha, the judge has told you it's got to be done before the call, so there can't be any calculations in the Neville patent and rely upon the Court's instructions. And I want some clarification of that issue so your ruling is not misconstrued.

THE COURT: All right.

MR. KNEBEL: Well, Your Honor, I have three responses to this, and they're all very simple. One of which is this claim construction issue was done several months ago, and the jury has already been read these definitions during the course of this case more than once. And to come out now [251] during the trial after that and say we'd like to undo it, seems to be –

THE COURT: Mr. Knebel, look at the paper you all have given me here.

MR. KNEBEL: Okay. The second here is to look at what they're proposing, a designation made prior to the phone call – telephone call of the parties. However, the patent indicates that this designation may include calculations during the phone call. So, this says a designation made prior to the phone call

can include things done after the phone call. That is an absurdity. There is no reason to clarify, the designation made prior to the telephone call of the first parties. The designation can't –

THE COURT: You know, I can tell you I am concerned about this. I have been mulling this over behind the scenes. I am concerned about what I have done here, because there has been testimony – you know, you have come into a courtroom with probably the most archaic mind you could get in terms of patents. I mean, there are many people here who are very smart about them, but not this person.

So, I'm listening to this testimony, and I did not understand that in these databases that there are these algorithms that can be put in there that will do these computations in a database. And so, you know, saying that a designation is made prior to the telephone call of the first [252] parties, it's set up so that this is going to happen in a certain way, but whatever lights it, whatever the ignition goes off, it may be that the algorithm kicks in. And –

MR. KNEBEL: Well, Your Honor –

THE COURT: So I don't want to – I want to present this – I don't want to present this to the jury in some way up that is not fair to what the testimony has been.

MR. KNEBEL: But all the file history says is that Mr. Neville's invention makes the assignments

to potential callers. A potential caller would be somebody who hasn't called yet, right? Will call.

THE COURT: Yes, but even – I mean, even in the file history with the testimony we have had so far, not hearing the defendant's side, which I can anticipate, it's been that was wrong, here it is, so and so. So, you know, I have become increasingly uncomfortable with a statement that skews this.

Now, I don't think this statement skews it. I think it can be argued the other way, but I do understand the argument that by saying this and with the other language that's gone on in that file history, I may be precluding the plaintiffs from being able to present their position.

MR. KNEBEL: I have a variety of views, but this particular way of clarifying it doesn't clarify it, because it says –

[253] THE COURT: Well, do you have another way?

MR. KNEBEL: I'm sorry?

THE COURT: Do you have another way?

MR. KNEBEL: The patent does not exclude calculations that are in addition to those used to make an assignment. We've never argued to the contrary.

MR. MILBRATH: Your Honor, Dr. Moore, Mr. Shaffer, Dr. –

THE COURT: Don't argue the facts to me. How about taking that, that would be a solution.

MR. MILBRATH: No, Your Honor, it's got to say something – surely, his own client has admitted that it would be possible to have stored procedures or algorithms, whatever phrase we want to use, that is put into the system ahead of time to make calculations for that assignment.

THE COURT: Well, the language that's been proposed is, "However, the patent does not exclude that calculations may be made during the phone call. What my concern is –

MR. KNEBEL: As long as the assignments have been done in advance of the call, you can stand – as one of my colleagues says, you can stand on your head and paint yourself red during the call, it wouldn't be skewed.

MR. MILBRATH: Here's the point that Mr. Knebel's trying to obscure. I can tell the computer to – in a database I'm going to always assign to this dealer or I can [254] tell the computer add two plus two and the sum will be how you decide this. And that's like a stored procedure.

THE COURT: But that is a designation made prior to the telephone call of the first party.

MR. MILBRATH: Exactly. So, what I'm looking for is some language that doesn't confuse the jury so they understand that I can have a stored procedure and algorithm in the database that

constitutes a, quote, assignment, closed quote, but nevertheless makes that calculation while the caller is on-line.

MR. KNEBEL: Well, Your Honor, the word assignment means to designate. It doesn't mean to set forth an algorithm. And we are going to have a debate about that. The Court went through an analysis of the file history. The word assignment is what's in the claim. The synonym for assignment is designate –

THE COURT: Okay, gentlepeople.

I am not convinced that adding the sentence, "the patent does not exclude calculations made during the phone call . . . " does not cover the problem, and I will put that in. What page does that go on so that we don't have any question about this later on?

MR. KNEBEL: Your Honor, this is a claim construction issue, right? The word assigning doesn't include or exclude anything.

[255] THE COURT: Just get me to the page before you begin your argument.

MR. MILBRATH: Page 12, I believe, Your Honor.

MR. KNEBEL: What we would like to do is if this is the only issue is to wait until all the testimony is in from the defendant's experts on this question of assigning or not assigning. There has not been anything from the defendants.

THE COURT: Well, I know that they will take the opposite position. And the point here is to charge in a fair way to both sides and let you all make your arguments, not to give one side an advantage by making a legal determination that now I have great discomfort with.

Page 11 is not –

MR. MILBRATH: It should be instruction 9. On my copy, it's page 12, claim construction for the case.

THE COURT: Here it is.

Okay. In this agreed jury instruction 9 there is additional language. And so, I'm going to put this on page 12 in a separate paragraph.

MR. KNEBEL: Your Honor, we're not agreeing to this with respect to the word assigning. The Court has already said that the patent doesn't include calculations during the phone call. That doesn't necessarily have anything to do with assigning. The Court has already said that. Your Honor, we have not agreed to this language on instruction 9. I don't [256] know what the Court is looking at.

THE COURT: All right. This is page 12 after the two lines on assigning a new paragraph that will not be in quotes are in italics. It will be like the third paragraph or the first paragraph. It will say, "However, the '111 and '689 patents do not exclude calculations made during the phone call."

MR. KNEBEL: I think that's consistent with the ruling that you've already made.

THE COURT: Okay.

MR. MILBRATH: May I request that the Court add the statement –

MR. KNEBEL: We object to that, Your Honor, unless it is consistent with the ruling the Court has already made.

MR. MILBRATH: May I just make my record?

THE COURT: Yes, you may.

MR. MILBRATH: I would request that the Court add to that sentence, "However, the patents – however, designation – this designation does not exclude calculations made during the call." Because it goes back –

THE COURT: I'm just going to leave it as it is, Mr. Milbrath, and I think it's clear. I'm not going to go any further than that.

Let me go to your next issue. Both of you are unhappy. Both of you object.

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UNITED STATES DISTRICT COURT
MIDDLE DISTRICT OF FLORIDA
ORLANDO DIVISION
CASE NO: 6:02-CV-1354-ORL-19DAB

800 ADEPT, INC., a Florida corporation,

PLAINTIFF,

VS.

MUREX SECURITIES, LTD.,
MUREX LICENSING CORPORATION,
TARGUS INFORMATION CORPORATION,
and WEST CORPORATION,

DEFENDANTS.

MONDAY, OCTOBER 2, 2006
CIVIL JURY TRIAL – DAY 8
BEFORE THE HONORABLE PATRICIA C. FAWSETT
CHIEF UNITED STATES DISTRICT JUDGE,
AND A JURY
ORLANDO, FLORIDA

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[5] DIRECT EXAMINATION [OF RANKA]

BY MR. MILBRATH:

Q. Dr. Ranka, please give us your full name again, please.

A. I'm sorry?

Q. Your full name, please.

A. Sanjay Ranka.

Q. And what is your occupation, sir?

A. I'm professor of computer science at the University of Florida, Gainesville.

Q. Dr. Ranka, I want to spend a few minutes discussing your credentials. You may want to adjust that mic so you're comfortable, because you're going to get neck pain.

A. How is that? Can you guys hear me?

Q. All right. Can you tell the jury how long you've been a professor and where you have been a professor?

A. I became a professor in 1988 on the faculty at Syracuse University in computer science. I left Syracuse University in [6] 1995, and I became a professor at University of Florida. Today I'm a full professor of computer science at the University of Florida.

Q. So, how long have you been a continuously employed professor in the computer science field?

A. Close to 15 years now.

Q. Have you ever testified in court as an expert witness before?

A. No, I have not.

Q. Hopefully, this will not discourage you from any other involvement.

A. It's pretty nerve-racking.

Q. Let's discuss your training and experience for a minute. Where did you obtain your initial training in computer science?

A. I did my bachelor's degree in computer science from Indian Institute of Technology. It's one of the premier institutions in India.

Q. And after your training in India, where did you next go?

A. I did my master's and PhD in computer science at the University of Minnesota in Minneapolis. I finished that degree in 1988.

Q. Does computer science relate to databases?

A. Yes. A database is part of computer science. As part of getting my degrees, I expected to cover a broad set of [7] topics, and database is one of the important topics that we learn as part of our training.

Q. In addition to your university training, was there a time when you were employed in the private industry in the computer science field?

A. Yes. I was the chief technology officer for a small company in Silicon Valley, which I am also a co-founder for. I ran that company for three years.

Q. What was the type of business that you ran?

A. The company was developing model technologies for doing marketing, using databases, and I've been the chief technology officer, was the architect of many of the products there.

Q. Have you, yourself, filed for United States patents in the computer science field?

A. Yes. I have obtained four patents as part of the work I have done.

Q. Could you tell us a little bit about your patents?

A. I got three patents when I was working for Hitachi America, Limited. I spent a summer working there as a consultant. And the main thrust of those patents were how to analyze large data, which is the field of data mining.

Q. And how does data mining relate to databases?

A. Data mining is a field which works with analyzing large amounts of information. So, for example, Wal-Mart may be looking at all the customer data they can figure out as far as [8] what the product the customer wants and what products they don't want. And part of that is looking at databases, analyzing information from them efficiently.

Q. Have you also taught graduate-level courses in the computer science field?

A. Yes. I currently teach graduate and doctorate level courses in computer science.

Q. And did you just recently obtain a recent patent?

A. Yes. I got a patent at the University of Florida in algorithms for radiation therapy on how to do those computations efficiently.

Q. As part of your role as a professor, do you regularly write publications in the computer science field?

A. Yes. I have written a number of publications. Fifty plus of my publications have been in reputable journals in computer science. I also have close to a hundred publications in international conferences.

Q. And are you also a co-author of textbooks in the computer science field?

A. Yes. I have written two books, one on computing and the other on – I'll repeat that again, one on super computing and the other one on lunar networks.

Q. As a computer scientist, are you involved in architecting or designing computer systems?

A. Right. As part of my responsibilities as the chief [9] technology officer at the Silicon Valley company, which I talked about, I designed a system, I architected a system. Part of that is design specifications, and then different experts work on different aspects of the system. And you work there with businesspeople who give you the requirements of what is needed to be developed for the customer and

then you try to incorporate that as part of the architecture.

Q. In the computer science field, is it common to be involved in various scientific disciplines for a particular database application?

A. Yes. It's expected from us to be the problem solver for a number of disciplines. So, for example, I have had contracts from the Department of Defense and National Science Foundation to develop systems for high-energy physics, where they have a large data problem, which they expect computer scientists to help the physicists. The physicists define the requirements. We solve it for them. The other examples in which we have done similar things for radiation therapy and, as part of my job, I did that for marketing.

Q. At my request, did you evaluate the patents that issued to Dan Neville in this case?

A. Yes, I have.

Q. Have you also evaluated the patents at issue to Moore and Shaffer?

A. Yes, I have.

[10] Q. And from your review of those patents, did you determine if there were any core concepts in those patents?

A. A large amount of material in these patents, as you probably have heard, is about databases, how to manage data in one table, two table, multiple-table

formats. That's a core issue in databases, and that's what I'm here to offer my expertise in.

Q. And did you interact from time to time with other experts retained by the 800 Adept lawyers?

A. Sure. The team of experts and the people who are focusing on telecom issues, there are people who are focusing on GIS issues. I am focusing on database issues, and we all work together as a team.

Q. And when you say GIS, you refer to what?

A. GIS stands for Geographic Information Systems.

Q. Now, Dr. Ranka, does the term database appear in the various patents that you inspected?

A. I'm sorry?

Q. Does the term database appear in the various patents that you inspected?

A. I believe so. The database term appears many, many times in all the patents.

Q. Okay. I'd like to pull up, for example, if you could pull up the '111 patent of Dan Neville in searchable PDF format.

* * *

[12] A. The database issues in these patents are relatively simple. What you would teach a student, as part of the first three or four lectures in a course, all

the issues here are extremely simple. They're not complex at all.

Q. So, could we characterize them as Database Computer Science 101?

A. Yes, that would be accurate.

* * *

Q. [13] Are there various types of databases?

A. There are several types of databases, relational, hierarchical, flat file, these are all dumps associated with databases.

Q. How do you define the term relational database?

A. A relational database is a collection of interrelated tables.

[14] Q. And in the computer science field, is a table sometimes called a relation?

A. Yes. The terminology used in computer science for table is a relation.

* * *

[27] (Witness returns to witness stand.)

Q. And while we're doing that, I want to go back to the Neville patent, Dan Neville patent '111, column 9, lines 48 and 50. Back to this passage, sir, about " . . . correlational database may be relational or hierarchical . . . ," you've told us what a hierarchical database is and what a relational database [28] is.

Do you have an opinion as to how many types of databases Mr. Neville's patent discloses as the database that may be used in call routing?

A. Well, I know that he describes a single table like a flat file database. He talks about a relational database. He talks about hierarchical database. That kind of puts in the universe all the kinds of databases that were existing around that time.

Q. Now, I want to see if we can relate Mr. Neville's use of these terms to some of the uses of these similar terms by the defendants. And I want to call up the Riskin patent, '267 patent, now owned by the defendants, column 13.

MR. MILBRATH: Riskin, Your Honor, I believe is in evidence. The plaintiff's version is 2496. I can find the defense version, if the Court would like.

THE COURT: Well, before this case is presented to the jury, I don't want any duplicate exhibits. We'll have one exhibit, and we try to use just one number.

MR. MILBRATH: Yes, Your Honor.

MR. VARE: It's Exhibit 10, Defendant's Exhibit 10.

MR. MILBRATH: Defendant's 10, we'll combine those.

BY MR. MILBRATH:

Q. So, let's go to column 13 of the Riskin patent, now owned by the Murex party. And the passage I want to direct you to is under database description, and we can enlarge that. [29] Do you see, "The Company database 36 is a collection of interrelated files. The database format is relational, that is, a series of files (two dimensional tables)." Do you see that?

A. Yes.

Q. And so, does that use relational in the same way that you used it?

A. Exactly, yes.

* * *

[40] A. Again, as I said before, the patent covers flat file databases, it covers relational databases, it covers hierarchical databases, so I don't see any obvious limitations in the kinds of databases which can be used for this [41] invention.

* * *

[42] Q. So, is there anything new about this expression or representation of connecting from a master to a client table?

A. No. This is, as I said before, Database 101. It's the first set of things which you learn as you learn about databases.

* * *

[46] Q. Dr. Ranka, did you see any evidence from reviewing the file histories of the Neville patent prosecutions that he ever [47] disclaimed any other formats, such as the two or more relational table or hierarchical table?

A. I did not see any evidence of that.

* * *

[50] Q. And by the way, in the actual computer, are they – whether you have a flat file, a relational database, or a hierarchical, is it stored that way in the computer?

A. It's stored in different ways. There are different ways of storing the same information. As I pointed to you before, you could store the information in one table, two table, hierarchy. It all depends on how much memory you want to spend and how fast do you want to get to the information.

* * *

[54] Q. Now, it says, " . . . the correlational database may be relational or hierarchical." So, from reading that disclosure in Mr. Neville's patent application dated July 1992, does it disclose the relational - do you have an opinion as to whether or not it discloses the relational table of the '897 patent on the defendant's?

A. Okay. Now, as I discussed before, you can easily convert from one table to two tables to three tables, as many tables as you want, depending on the

needs of efficiency and the fact that we're talking about a database there, which can definitely have multiple tables. You are disclosing a two table, three table, four table formulation in the description.

Q. And does Neville – although Neville doesn't use the term spatial key, do you have an opinion as to whether or not, [55] by reciting a key or a primary field in the database can be the vertical-horizontal coordinates of the ANI for relational system, whether Neville disclosed the use of relational key to link two or more tables together?

A. He does, because he's talking about a key which, in this case, seems to be V-H or it is V-H coordinates. But again, as I told you before you, can use spatial keys or you can use normal keys. At the end of the day, all you're doing is linking from one table to another table.

* * *

[62] Q. And would it be correct to characterize the Neville patent as only a single table?

A. No.

Q. Let's go to the reasons for allowance. So this is the statement by the Patent office, the second paragraph, "The remarks of the response filed 6-29-01 are deemed persuasive . . . " Do you see that?

A. I'm sorry, I need to –

Q. I'm sorry, its page 241.

A. Page 241?

[63] Q. Yes.

A. Okay.

Q. The last page.

A. You were showing a different page there, so.

Q. Okay.

A. Okay, refer me to the lines.

Q. The second paragraph, "The reasons . . . "

A. Okay.

Q. "The remarks of the response are deemed persuasive . . . " Do you see that?

A. Right, mm-hmm.

Q. And then, drop down a few sentences. You'll see, "Claims 1 through 84 are allowable over the applicable art of record. The subject claims provide use of a spatial key which is found in a master data table, file, or database, and is associated with the calling telephone number, the spatial key is used to look up a corresponding destination telephone number in a client data table, file, or database. In contrast, the applicable art of record uses a telephone number to telephone number look-up in a single table or database." Was that an accurate statement?

A. No, that is not an accurate statement. In fact, if you read through this whole thing, it talks

about two things, one is multiple tables, and I had discussed with you converting from single table to multiple tables, that wouldn't be an easy [64] thing for anyone to do. The use of spatial key is pretty well known. Neville, in his disclosure, talks about relational databases, which all of us assume is a collection of relations, so I think the examiner was completely wrong there, because his arguments are not correct at all, so he's completely wrong.

Q. And whether one, two, three, or four people signed it, is it still wrong?

A. Sure. Something is wrong, whether a hundred people sign it, it still is wrong.

Q. Does Neville disclose that that architecture, its use of a relational database and a spatial key, whether its called that or not?

A. Yes, he does. But as I told you before, in this particular case, whether you use a spatial key or some other key to link multiple tables, you can link them in a lot of different ways. And there's nothing which you need for the key to be spatial.

* * *

[66] Q. Yes, sir. Do you have an opinion as to whether it would be accurate for the defendants to characterize the Neville patent as a mere static one table system?

A. No, it would not be.

Q. Does the Neville patent involve the use of calculations while a caller is on the line?

A. Yes. As you were discussing in examples before, to get [67] to a particular show or a particular time or a particular channel at a particular time, you first need to scan down, and the computer automatically would figure out what row is that particular show in. And then, if you look at the right column, you need calculations to reach from that particular location and then need calculations to access that information. So, all those calculations have to happen during the time when the caller is on hold in implementation of Neville's patent.

Q. Now, let's suppose you're using the one table preferred way to do it in the Neville patent. When the call comes in you've got that telephone to telephone database loaded in the telephone network. What type of calculations would be minimally necessary for that?

A. The minimal number of calculations, which will be needed will be at least ten or twenty where you first need to – remember you, have 100 million numbers, right? So, for example, you were trying to look for someone's phone number in the white pages or the yellow pages. You have a rough idea of where my name starts at, Sanjay, right, so it'll probably be somewhere at the end.

Then, you figure roughly where the page is, then look around, get to the right page, then you get to the right column. So, computers effectively do

calculations in a very similar fashion. They need to make multiples to look up and [68] figure out the data record is sitting at that place and all those need calculations.

Q. Now, does the Neville patent disclaim the use of any calculations?

A. No, it does not. In fact, it could not, otherwise you couldn't implement it.

Q. Otherwise, it would what?

A. Otherwise, you would not be able to implement it in your real system. You have to do calculations in the real system at the time of the call to figure out where to direct the call to.

Q. And if you're going to implement the Neville system using a relational format, consistent with his disclosure, would that involve calculations as well?

A. Sure. There could be calculations involved where you are first getting to that – just like the example which we considered, before – it could be that you're getting to the first table, getting information, locating it, linking it to another table, and getting information from that, all that needs calculations.

Q. And what about somebody who wanted to use the older hierarchical format, the tree structure, would that involve various calculations as well?

A. Again, the same thing holds true. I talked to you about having first at the top level area code, then

having NPXs, [69] which is the next three digits. So, first you figure out what place is that particular area code, then you figure out the MPX or NPX listing, which is the local telephone exchange listing. I guess, I can go down there and see if that makes it easier –

Q. That's all right. I'm just getting the drawings together.

A. All right. And then once you get to that, then you come down to the next level where you have the phone numbers. To get from top to bottom, you need to scan information along the way to get to that, and all those are computer calculations. And at the end of the day, computers can run everything from add, multiplies, looking for a piece of information, et cetera, et cetera, but all those take time.

* * *

[79] Q. So, there's a difference between doing calculations on-line and off-line in this context?

A. In this context, yes. And the reason being that whatever calculations you do on-line, that means the caller is on hold during that time. You want to make minimal amount of calculations so that you can reduce the wait time for the caller.

Q. So, there's a difference in the actual context of call routing, right?

A. Yes.

Q. But you don't know how long it takes any of the calculations to be done, do you?

A. Well, I mean, again, you can find out from the number of [80] instructions you are using and the technology in which you are using. So, if we look at computers, there are slow computers and there are faster computers, and they all run at their own rates, and the same calculation may take less time on one and more on the other one.

Q. The word on-line, does that mean the same thing to you as real time?

A. Again, in this context, when we're talking about on-line, we're talking about real time.

Q. Okay. So on-line calculations are done during the call?

A. Right.

Q. Would also be called real time calculations?

A. They would be called real time calculations in this context.

Q. You've heard the term table in the context of your computer science background, right?

A. Sure.

Q. And a table, I think, is just a set of data, data elements, or values that are typically organized in rows and columns; is that fair?

A. Yeah. I mean, again, if you want the computer science definition of it, that's not precise, but basically what you're talking about is many rows and

many columns. And each row and column has some value attached to it.

* * *

[82] Q. So, Mr. Neville, the inventor, called his document, this document we're looking at, a look-up table, right?

A. No, you're talking about this sheet, right? You're not talking about the entire document.

Q. I'm talking about this document.

A. Yeah, he's calling, I guess – if he's – and I believe you that this is Neville's thing so, yeah, it is a look-up table.

Q. At the bottom, you see where he calls it the Neville system?

A. Right.

Q. Okay. So you would agree that Mr. Neville, the inventor, has described the Neville system in this document as a look-up table?

A. Now, again, you are just showing me one sheet of paper without the background before or after. I mean, all this says is one way of doing what he's doing. It doesn't mean that he can't do other ways. That's not the case, as you're trying to imply here, right?

* * *

[86] Q. Okay. Now, you would agree, however, that a distance calculation is different than the look-up calculation you just described, right?

A. No. I mean, I think, in my mind, if you look at computers, they have distance calculations. At the end of the day, everything becomes add, multiply, subtract. So, computers don't care whether it's a distance calculation or a look-up calculation. In both those scenarios, you essentially are talking about computer calculations. Now, if you're trying to, on the other hand, differentiate A versus B, you can say, look, again, as I said before, you're talking about calculations at the end of the day. Computers don't care much about distance or otherwise.

[88] Q. The question, sir, was you would agree with me that look-up calculations are different than distance calculations, correct?

A. Well, counsel, again, let me give you an example. If I [89] have a radius calculating calculation or if I have a finding the closest provider calculation, these are all going to be different sets of calculations, but they're all calculations. So, you know, you're trying to say, look, table look-up is different from this sense, I can come up with fifty other different ways of different kinds of things which I'm calculating, and each of them would be different calculations. . . .

* * *

[93] Q. Dr. Ranka, I thought you told us on direct that it would be impossible to eliminate on-line calculations using Neville's system, impossible?

A. Exactly, so I agree with that, if you need to do on-line calculations. And what I don't know from this is what on-line calculations is he eliminating, based on reading it. That's all I'm trying to say. There will be on-line calculations, because you need them. The question is, what you're asking me is what is he eliminating here, and that I cannot say by looking at those three lines.

Q. You don't know?

A. And also, I believe it says, eliminating the need. That doesn't mean that he can never do it. It just says that, look, if you don't need it, you don't do it. Does it mean [94] that you always don't do it? I don't see that either.

Q. Okay, this is a simple question. What on-line calculations is Mr. Neville referring to?

MR. MILBRATH: Objection: Asked and answered.

BY MR. VARE:

Q. Let me back up. I'll withdraw that question. We talked about look-up calculations, correct?

A. As I said –

Q. And we talked about distance calculations.

A. Sure.

Q. We talked about two types of calculations?

A. Right. There could be a third and a fourth and a fifth. I don't know which one is he talking about, all right?

Q. Don't you think that would be important to know which one he is saying I'm eliminating?

A. Well, again, first of all, he's saying eliminating the need. It doesn't mean – does it mean he's eliminating? All he's saying, look, it doesn't mean I don't need to do something. Does it mean that always? It's the same thing. We're looking at one table's formulation. We didn't have the need to go and look for a particular cell within that table. We could already get to it. In the two table formulation, you need to go through two steps. The question is in one case you eliminate the need of going from one table to another one. Does it mean that you can't do it with two tables? You can [95] always do it with two tables.

* * *

[99] Q. So, Mr. Neville has said that Riskin performs the shortest-distance algorithm, that's a distance calculation, right?

A. Okay. If I read, this what it is telling me is that Mr. Neville is smart, that he can actually do it without distance calculation. Does it mean that he doesn't allow for it? I don't read anything of that nature at all here. All [100] he's saying is, look, I can

do it without distance calculation. It doesn't say that's the only way I can do it. That's what I read here.

Q. It doesn't say he does do it, does he?

A. Again –

Q. It says – Mr. Neville says he automatically matches, right?

A. Again, if you're looking for a specific disclaimer, I don't see it here.

* * *

[111] Q. And Riskin does multiple database queries, and multiple means more than one?

A. Exactly. What I just said to you is what he's saying is, look, I am smart and can do it with one. Does it mean you can't do it with multiple? Obviously, you can do it with multiple. You can do it with single and get a null query and then you have multiple queries.

* * *

[119] Q. And I want to ask you a little bit about a single database query. In a single database query is it possible to call it subroutines rather than calculations?

A. Yes. There are some things called stored procedures, which you can store inside the database. It's like saying, okay, go do this, because you do that again and again, so rather than trying to program that, you just put that as part of the database, and

then you just make a call to that, and that could actually execute a program in itself.

Q. If you look at the representation shown in Exhibit 17, what would a look-up involve?

A. Again, it could involve a lot of things. It could – the way I look at this description here just by, again, looking at this page alone, this could basically be that you're requesting – a query could be looked for information regarding this particular ANI, and that could involve a number of calculations, which would be executed by the database. The look-up itself could be a stored procedure, which is again executed by the database.

Q. So, it's not simply a matter of pulling a number out somewhere. There might be a series of calculations?

A. It's not pulling a number out. Again, remember, you're talking about a hundred million numbers here. You can't just pull out from some place very quickly. You need to get to it in a way that it is stored.

[120] Q. Now, I'd like to go back to the '111 patent, Figure 1, keeping in mind Defendant's Exhibit 17 shows simply a phone number and a phone number, in the '111 patent of Mr. Neville, Figure 1, if we could zoom in on the table that is shown here.

A. Sure.

Q. On the left, we have the full ten-digit phone numbers of callers. And on the right, a service location telephone number. Do you see that?

A. Yes, I do.

Q. In between those two you have latitude and longitude coordinates?

A. That's correct.

Q. If you were simply doing a look-up table, would those latitude and longitude coordinates that are illustrated there be necessary?

A. Again, as I discussed before, if all you were doing was trying to find a match and just have one number to another number conversion, you do not need the latitude, longitude; although you could have it because, you know, you may have more than one table. In a scenario like that, you will keyboard information, too.

Q. And just because Exhibit 17 was shown in the file history, would that suggest to you that you would just eliminate the latitude and longitude coordinates from that?

A. No. I mean, I think, again, my impression of the [121] discussion we had before was that Neville was trying to compare his system with another one, and he was trying to show what the major differences are.

Q. Can you think of reasons why the latitude and longitude coordinates would be illustrated in figure one?

A. I think what Neville is trying to show is, look, you start from a phone number, relate that to the latitude and longitude, and then relate the latitude-longitude back to the service provider.

Q. Could you use the latitude-longitude coordinates in a calculation?

A. Yes, you could use latitude and longitude. For example, you could use the latitude and longitude to look up another table or you could use them side by side.

Q. Could you also use latitude-longitude coordinates to do a distance calculation?

A. You could use latitude and longitude for doing distance calculations, too, because you have information about what latitude-longitude this caller is calling from, and you can now calculate the distance using that information.

* * *

[126] Q. Does the Neville patent involve real time calculation?

A. Yes. As I discussed before, there were real time – you need to do lots of computing, lots of processing, to look up stuff from one table, two tables, any number of tables, so there are calculations which

required for you to be able to actually run the system in the real world.

* * *

UNITED STATES DISTRICT COURT
MIDDLE DISTRICT OF FLORIDA
ORLANDO DIVISION

CASE NO: 6:02-CV-1354-ORL-19DAB

800 ADEPT, INC.,
a Florida corporation

PLAINTIFF,

VS.

MUREX SECURITIES, LTD., MUREX LICENSING CORPORATION, TARGUS INFORMATION CORPORATION, and WEST CORPORATION,

DEFENDANTS.

MONDAY, OCTOBER 16, 2006

CIVIL JURY TRIAL – DAY 15

BEFORE THE HONORABLE PATRICIA C. FAWSETT CHIEF UNITED STATES DISTRICT COURT JUDGE, AND A JURY
ORLANDO, FLORIDA

[TESTIMONY OF BRODY]

* * *

[151] Q. Did you go about evaluating the issue of one of ordinary skill in the art in the field of the invention?

A. Yes. One of ordinary skill in the art would certainly have a Bachelor's degree in telecommunications, electrical engineering, or related area and

would certainly have several years of experience involved with telecommunications and would probably from that experience get some feeling for how to interact with people programming databases and understand how databases work.

* * *

[152] Q. So, what level of knowledge would you consider one would have to be one of ordinary skill in the field of GIS technology?

A. One would just have to understand that one could draw boundaries around things, understand that you contract these things, you can understand how to calculate nearest distances, Calculating nearest distances is fairly well known. You learn that in high school. The point and polygon calculations you might learn later on in school, maybe in college, but it's fairly well known in the art.

* * *

[159] Q. Tell us what characteristics of the '111 patent of Mr. Neville you found to be present that was not disclosed in the prior art in one reference or the other?

A. Well, first off, the Neville patent teaches 10-digit routing, using the full 10 digits of the calling number or ANI. It also teaches the use of the spatial key. It also teaches a one table preferred embodiment, which we've heard a lot about. It also teaches that one can do this in a relational or hierarchal database. It also teaches that one can use default

methods where you can automatically figure out how to route the call that's not going to an operator. Those are examples of some of the things that are in the back.

* * *

[166] Q. From your review of the '111 patent, did you determine how many embodiments of the invention there were?

A. There were at least the embodiment of a single table, which is the preferred embodiment. There was also disclosure of the use of hierarchal databases and relational databases testified to by Dr. Ranka. Relational databases are all known to be multitable systems. So, the Neville patent clearly teaches you can do it in a single table or you can do it using multiple tables.

* * *

[174] A. Well, the Patent Office has made a few mistakes, and [175] those mistakes they keep making over and over. The first mistake is they keep saying the Neville patents are only a single table patent. And the second mistake that they keep making is that the Neville patent doesn't have spatial keys. And the third mistake that they make is that – well, in this particular case those two are big enough, because it's the reason for, at this point in the re-examination of the '897 patent, first they rejected all the claims, except two or three, because Neville anticipated all the claims, including claim 69, which has been asserted by the defendants against us.

Then, they come back. The defendants told the Patent Office yes, but we are two table with a spatial key, and Neville doesn't do that. And, based on that representation made by the defendants to the Patent Office, they clearly influenced what the Patent Office decided, and the Patent Office changed its mind and said, okay, now these claims are allowable over Neville, because Neville is only one table and doesn't use a spatial key.

* * *

[179] Q. And does your report address whether if you combine those, you somehow magically end up with a telephone number to telephone number table, like Mr. Shaffer told the jury today?

A. I couldn't understand how the spatial key, which is the telephone number, could then be linked – be used to link to the other table the way they describe the patent. And I further went on. In my report I recited that, first of all, there's a complete teaching away from using one table systems.

The defendants, throughout the written specification of the '897 patent, pointed out that a two table system is the way you go. . . .

* * *

[183] [A.] They filed the original '897 patent in February of 1993. And I believe this one table disclosure did not occur until sometime in 1997, 1998, after they'd already come out and filed for their one table

patents, which start with the '868 patent of the defendant.

* * *

[192] A. Now, children of the '868 patent are several other patents. And they all share the same written description. So, any of the claims that rely on the new matter that's in the '868 would also have the same priority date of 6-96.

Q. For ease of understanding, can we think of that as a family, the '868 family patent?

A. Yes, this would be the '868 family. We've heard about the '608. We've heard about the '982. We've heard about the [193] '810, and I believe the last one is the '397. I believe these were all – '608, '982, and '397 were actually filed on the same date, and the '810 is a little later. Since the spec is all the same, any new matter that came as a result of real time or one table or other new matter would get the 6-96 priority date.

Now, there are two more patents left that haven't been talked about much. This is the '214 patent. And a continuation of the '214 patent is the '179 patent. This patent, the '214, was actually filed as what they called provisional patent application.

What you do is you have an idea, but you don't have time to put together a full patent application. You put a provisional application in as a place holder. And then, within a year you make your

official application. That was done, this provisional application, was in 6-96.

And so, anything that was new matter in the '214 patent was no new matter. It's a completely separate line. There's no relationship back to the '897. It's not a continuation. It's not a continuation in part. It's a completely new pattern. So, all the claims here can't be any earlier than the 6-96 filing date of the '214 – or is it 8-96? I may be wrong. It may be 8-96.

* * *

[209] Q. Did you also consider whether the Federal Express pilot project was important to the issue of validity?

A. Yes, I did. And the first thing I did was determine whether the Federal Express pilot project was, indeed, prior art. And my determination was that it was, based on the documents I reviewed. It was working as early as December 1994, more than a year before the filing of the '131 patent.

Mr. Shaffer, himself, was trying to convince Fed Ex that it was commercially viable, because in an analysis he did he said 71.6 percent of the calls were getting the appropriate information. So based on that and the fact that I'm aware that the payments were made revolving Federal Express and they were trying to improve its commercial viability not whether it would work, that would meet the on sale bar in the Federal Express pilot project. Notice it says pilot project, not test.

Q. Did you see anything in the contract with Federal Express that defined any alleged experimental use?

A. No, I did not.

* * *

[220] Q. And does Neville disclose real-time processing?

A. Yes, Neville does.

Q. Can you give us some examples that you mention in your report?

A. Well, in my report, I point out one of the examples is the NCP, which would have to do with the real-time processing in order to take a number that would have like a cell phone and process it. . . .

* * *

[10/18/2006 Day 17 Transcript]

[28] [A.] . . . So Neville, in doing real-time calculations, being a multitable system, could also add that type of table from Fed Ex.

* * *

[30] Q. Then, the next step is, "indexing the retrieved spatial key into at least one spatial key indexed database." What would that be?

A. So this would be taking that spatial key and now going to another database, another table, and using that key to find some additional information. So that could be, say, the client table from the '897 patent or the advertiser table or dealer table from the Riskin patent or the client table from [31] the Neville patent.

* * *

[89] [A.] So let's assume that that's true and we have real-time calculations now. We then have to go and say, look at assigning. And now assigning, if everything has to occur before the call, then I have to do real-time calculations for a cell phone, the only way I can match this up is to say that this particular claim, perhaps, does not include doing assignments that are made after the call, but clearly the entirety of the patent includes on-line calculations, particularly for this cell phone application.

* * *

[140] Q. Now, if you look at the abstract of the '111 patent, for example, there's reference to second party criteria, and I direct your attention in the middle of that abstract. It says, "Such criteria could be existence within a previously defined geographic area a custom defined geographic area or through calculations such as the shortest distance between coordinate points." Do you see that?

A. Yes, I do.

Q. And could one allow for such calculations through stored procedures?

A. Yes. One could do a shortest distance calculation in the stored procedure.

Q. And did you find in the '111 patent disclosures making nearest dealer determinations?

[141] A. Yes. Right before the claims and the summary of the invention, Mr. Neville does state that this invention should be used for various things, service areas of any size and identifying nearest location.

* * *

UNITED STATES DISTRICT COURT
MIDDLE DISTRICT OF FLORIDA
ORLANDO DIVISION

CASE NO: 6:02-CV-1354-ORL-19DAB

800 ADEPT, INC.,
a Florida corporation

PLAINTIFF,

VS.

MUREX SECURITIES, LTD., MUREX LICENSING CORPORATION, TARGUS INFORMATION CORPORATION, and WEST CORPORATION,

DEFENDANTs.

THURSDAY, SEPTEMBER 22, 2006

CIVIL JURY TRIAL – DAY 3

BEFORE THE HONORABLE
PATRICIA C. FAWSETT, AND A JURY
CHIEF UNITED STATES DISTRICT JUDGE
ORLANDO, FLORIDA

[TESTIMONY OF J. SIERRA]

* * *

[16] Q. Thank you. Mr. Sierra, does the name Dennis Ainge mean anything to you?

A. Yes, it does.

Q. How do you know about Dennis Ainge?

A. Denis Ainge contacted me around September of 1996.

Q. And, Mr. Ainge – this was about two months before Mr. Moore contacted you by letter?

A. Yes, approximately, two months before.

Q. Was this a telephone call or what was it?

A. Yes, yes. He called me, and we spoke on the phone several times.

Q. What did Mr. Ainge – first of all, did he identify to you that he was working on behalf of Targus?

A. No, no. He told me he was the director of sales of a company called Belleek that sells pottery.

Q. So that's what he told you, he was director of sales for Belleek pottery?

A. That is correct. It sells pottery, stoneware, that sort [17] of thing.

Q. When he called you, what did he say he was calling you for?

MR. KNEBEL: Excuse me, Your Honor. This is going be hearsay, if there's not some sort of connection.

THE COURT: Is Mr. Ainge going to testify?

MR. KNEBEL: Yes.

THE COURT: He will be subject to cross examination on the other side of this conversation, so I'll overrule the objection.

A. Okay. When he called me, he asked me if we could do, what we euphemistically call dealer locators, which is terminology for call routing problems. And he told me that the pottery was sold through the Macy's chain of stores and that he was interested in knowing more about us and could we do a program for him.

I replied, of course, that's exactly what we do for a living. So, we had several more conversations and eventually he asked me if I would put together a package, a typical package, of information we would send to perspective clients asking the many questions he had asked of me.

Specifically, he asked if I would do a map, a physical paper map, okay, of New York city. I said, yes, we can. And so, it's a wall-sized map about two foot by three foot or something like that. In that area he wanted me to [18] plot the Macy's stores in and around New York city. I said, yes, we can. I asked him if he would provide me with that information. He said no. And he asked me if I had the information, I said, no, but we can dig that up from our files.

Q. Wait, wait. You asked him if he could provide you what information?

A. I asked him if he could provide me with a list of stores that he wanted us to use in our map.

Q. Which stores were these?

A. This would be the Macy's stores.

Q. And what was Macy's connection to Belleek pottery?

A. Okay. He stated that Belleek sold its pottery through the Macy's chain of stores, okay. So, he asked me if we could then do a program that when you dial a number would send the call to the particular Macy's stores. I assume it was the department that deals with china, pottery or, you know, glasswares, and the like within the Macy's store. He asked me if we had the information, asked if we could dig it up from our own files, I said yes, we can.

Q. The information for the location of the Macy's stores?

A. That is correct. That comes from our large console file that I was talking about. So, we went and we searched our file, found the Macy's stores in and around New York city, physically, you know, plotted a map, a nice colored map, very [19] pretty, laminated map, that kind of stuff. So we physically plotted them. I asked him for criteria that he wanted to use. He said, well, how about the nearest. I said, fine, we could do whatever criteria that you want.

So, we made this map. Alongside with the map, I sent him information that he had also requested, information that typically would be asked for large clients, okay. A large client would want to know references, give me some references. So, I gave him

references of our large customers at the time, which would have been Allstate Motor Club, it would have been Ryder, and it would have been Enterprise Rent-a-car.

He also talked about pricing, so we gave him some idea about pricing. I said, well, a lot of the pricing has to do with the size of the operation. We talked about where to set it up. I made some suggestions in my letter. So anyway, I sent a package of letter, I believe my reply was early October.

* * *

UNITED STATES DISTRICT COURT
MIDDLE DISTRICT OF FLORIDA
ORLANDO DIVISION

CASE NO: 6:02-CV-1354-ORL-19DAB

800 ADEPT, INC., a Florida corporation,

PLAINTIFF,

VS.

MUREX SECURITIES, LTD.,
MUREX LICENSING CORPORATION,
TARGUS INFORMATION CORPORATION,
and WEST CORPORATION,

DEFENDANTS.

THURSDAY, SEPTEMBER 22, 2006
CIVIL JURY TRIAL – DAY 3
BEFORE THE HONORABLE
PATRICIA C. FAWSETT, AND A JURY
CHIEF UNITED STATES DISTRICT JUDGE
ORLANDO, FLORIDA

[TESTIMONY OF J. SIERRA]

* * *

[100] A. Well, like I said, once I had my discussion with Jim Whiteley, then I turned to Allstate, okay, and Allstate was turning to me. And their questions to me is what am I going to do to make it go away.

Q. Allstate is asking you?

A. Allstate is asking me. Dave St. Claire was asking me personally, okay, what are you going to do to make this go away, because they are now the recipient of a lawsuit in which they have – they don't have a dog in the fight. They are the customer. So, they're saying why am I in this, you know, why do I have to indemnify anybody? So they're saying to me –

Q. And this is at the meeting in January?

A. This is at the meeting.

Q. 2004?

A. On January 7th of 2004, he's asking me what am I going to do to make it go away. I'm telling him, "I didn't sue you. Murex sued you. I can't make something go away that I didn't start. I'm already in the suit with those guys. I've got no control over what they're doing." So, Dave St. Claire, frankly, at that point, I guess, he got upset. He didn't understand there was nothing I could do about it and left the meeting.

* * *

[102] Q. Now, who is Al Dyon?

A. Al Dyon is the president of the Allstate – well, he retired, but he was the president of the Allstate Motor Club.

Q. Did you have a meeting with Al Dyon scheduled for the day of that January 2004 conference with Allstate?

A. Yes. In fact, he had – prior to my departure to go up, [103] he had called me, and he had scheduled a dinner for that night, and he had scheduled an award he was going to give us in anticipation that he expected the contract to be signed. And, you know, it was kind of a historical practice that we had that, you know, we always had some kind of celebration after the contract was signed and go have dinner, et cetera, so he had scheduled that, yes.

Q. Did he give you any sort of an award?

A. Yes. After the meeting, I was asked to stop by his office, and I did. He told me that he had been told by St. Claire that he could not go to dinner with us, because negotiations were still going on, so to speak. So he had prepared a plaque, an award plaque, for ten years of service and so forth, you know, it was a very beautiful plaque, and he'd give it to me right there. He said, well, we won't be able to meet tonight, because I'm told that negotiations are still ongoing. And while negotiations are ongoing, you know, I'm not going to do buddy-buddy, fraternity kind of thing. So, he says I want to make sure you get this.

Q. And what did the plaque say?

A. The plaque said something like for ten years of our, you know, our help, our wisdom, and our vision to help them to where they were, to where they had gotten.

* * *

UNITED STATES DISTRICT COURT
MIDDLE DISTRICT OF FLORIDA
ORLANDO DIVISION

CASE NO: 6:02-CV-1354-ORL-19DAB

800 ADEPT, INC., a Florida corporation,

PLAINTIFF,

VS.

MUREX SECURITIES, LTD.,
MUREX LICENSING CORPORATION,
TARGUS INFORMATION CORPORATION,
and WEST CORPORATION,

DEFENDANTS.

WEDNESDAY, SEPTEMBER 27, 2006
CIVIL JURY TRIAL – DAY 7
BEFORE THE HONORABLE
PATRICIA C. FAWSETT CHIEF UNITED
STATES DISTRICT JUDGE, AND A JURY
ORLANDO, FLORIDA

[TESTIMONY OF J. SIERRA]

* * *

[57] MR. KNEBEL: Thank you.

BY MR. KNEBEL:

Q. Now looking at the note, it says, quote, this process and relationship can be done real time or it can be pre-determined, depending on client-defined

criteria. What [58] does real time mean in the context of that sentence in your document?

A. Counselor, I have no way of saying it except you really do enjoy flogging a dead horse. Okay, here goes. Real time is whatever happens that requires calculation while the caller is on-line. And that is an inherent part of having relational systems, okay?

When you have a relational system, there is something that must occur, because you have two tables, and it requires to link from here to here in order to know the final answer, okay? And that is done while the caller is on-line, because you do not – when the caller is on-line, you find this table, phone number that's going to give you a link to find the final answer on the second table. That is exactly what we do when you have a one-table system, only that particular piece of work is done in our office rather than in a platform. It's the same thing.

Q. Does real time mean when the caller's on the phone?

A. We've covered that. That is our understanding, you know, whether you're calling on-line or real time, you know, I think it means the same thing.

Q. So, on-line means the same as real time?

A. Personally me, I would agree with you. Ask a different person, you may get a different answer.

* * *

[69] BY MR. KNEBEL:

Q. Is it true that Mr. Neville's invention dealt with look-up tables and had nothing do with on-line calculations; is that true?

A. Mr. Neville's patent covers both systems. Now, sometimes, as a practice, the fact that the Neville patent covers A, B, C, D, E, F, G, H, as a practice we don't necessarily do all of them, we do certain things, okay?

* * *

UNITED STATES DISTRICT COURT
MIDDLE DISTRICT OF FLORIDA
ORLANDO DIVISION

CASE NO: 6:02-CV-1354-ORL-19DAB

800 ADEPT, INC., a Florida corporation,

PLAINTIFF,

VS.

MUREX SECURITIES, LTD.,
MUREX LICENSING CORPORATION,
TARGUS INFORMATION CORPORATION,
and WEST CORPORATION,

DEFENDANTS.

FRIDAY, OCTOBER 13, 2006
CIVIL JURY TRIAL – DAY 14
BEFORE THE HONORABLE
PATRICIA C. FAWSETT CHIEF UNITED
STATES DISTRICT JUDGE, AND A JURY
ORLANDO, FLORIDA

[TESTIMONY OF SHAFFER]

* * *

[190] Q. And paragraph 13 says Federal Express owns the documents?

A. That's correct.

Q. And, in fact, what it says is that, "All formula processes, machines, compositions of matter, or improvements thereon, computer programs,

know-how, discoveries, techniques, drawings, specifications, renderings, and all other documents, data, and material, in any way related to the work produced by the consultant for Federal, pursuant to this agreement, shall be the sole property of Federal," Did I read that correctly?

A. That's what it says, yes.

Q. Well, that's what you agreed to, right?

A. In the contract, yes.

Q. Okay. And, in fact, it goes on, doesn't it?

A. It's longer.

Q. Yes. And what it says subsequently is that you assigned Federal Express the invention, right?

A. I don't see that.

Q. All right. Well, let me read it to you.

A. Okay.

Q. It's in the very next paragraph, paragraph B. And read along to make sure I read it correctly.

A. Okay.

Q. "Consultant hereby assigns to Federal any right now held or hereafter acquired by consultant in the materials [191] including, but not limited to, any copyright, patent, or other statutory or common law protection." Did I read that correctly?

A. Yes.

Q. So, you were assigning to Federal Express everything you were doing as part of this experiment, correct?

A. No.

Q. So the contract's wrong?

A. Well, we had an agreement with John Matson that since this was an $8,000 pilot that we'd just use their standard contract, and they would opt out on this at the end.

Q. So the contract doesn't mean what it says?

A. That's correct.

Q. That you had some other signed agreement?

A. That's correct.

Q. And you had that understanding, right?

A. That's correct.

Q. But if we turn to paragraph 16 of the contract, subsection E, what it says is, "Except as otherwise provided, this agreement shall not be modified except by written agreement signed on behalf of Federal and the consultant by the respected authorized officers." Do you see that?

A. That's what it says.

Q. Okay. So, under the terms of the agreement you didn't have that oral understanding?

[192] A. That's correct.

Q. And what Federal Express has in this agreement was that they owned everything with regard to the '131, right?

A. That's what it says.

Q. Okay. But there was some oral agreement somewhere?

A. Yeah, that's correct.

Q. Okay. And when you told the Patent Office that it was experimental, this one document happened to be left out, right?

A. Our attorneys sent what they thought was appropriate.

Q. So, would you agree with me that if you don't own what's claimed in the '131 that you shouldn't have the patent for it?

MR. KNEBEL: That's a legal question, Your Honor.

THE COURT: I'll sustain the objection.

BY MR. GILCHRIST:

Q. Are there any other written agreements that would suggest you own what you developed at Federal Express?

A. Whether it's a nondisclosure agreement.

Q. So, nondisclosure agreement. Any document that deals with ownership was the question.

A. Not that I'm aware of.

Q. So, the only document the jury can see with respect to who owns the technology of the '131 is what we have as the consultant agreement, right?

A. Yes.

* * *

UNITED STATES DISTRICT COURT
MIDDLE DISTRICT OF FLORIDA
ORLANDO DIVISION
CASE NO: 6:02-CV-1354-ORL-28DAB

800 ADEPT, INC., a Florida corporation,

PLAINTIFF,

VS.

MUREX SECURITIES, LTD.,
MUREX LICENSING CORPORATION,
TARGUS INFORMATION CORPORATION,
and WEST CORPORATION,

DEFENDANTs.

THURSDAY, OCTOBER 19, 2006
CIVIL JURY TRIAL – DAY 18
BEFORE THE HONORABLE PATRICIA C. FAWSETT,
AND A JURY
CHIEF UNITED STATES DISTRICT JUDGE
ORLANDO, FLORIDA

[TESTIMONY OF NEVILLE]

* * *

[7] Q. Now, we've talked generally about the time frame when you got there August '91 and through your work on predominance. At the time that you completed your work on proof of concept, at least for predominance, it was when?

A. That would have been March of '92.

Q. And how do we know that?

A. Because those are the dates on – that's where I [8] processed the Donnelley data to prove the concept.

Q. By that point and time, can you tell us whether your work was finished in terms of having a fully developed concept of an invention?

A. By that point and time, I think all the puzzle pieces were there. I had the 10-digit information. I was able to assign boundaries. I was able to match boundaries. If I didn't know all ten digits of the phone number, I had a way to anticipate where they would be, so I would say yes.

* * *

UNITED STATES DISTRICT COURT
MIDDLE DISTRICT OF FLORIDA
ORLANDO DIVISION
CASE NO: 6:02-CV-1354-ORL-28DAB

800 ADEPT, INC., a Florida corporation,

PLAINTIFF,

VS.

MUREX SECURITIES, LTD.,
MUREX LICENSING CORPORATION,
TARGUS INFORMATION CORPORATION,
and WEST CORPORATION,

DEFENDANTs.

MONDAY, OCTOBER 23, 2006
CIVIL JURY TRIAL – DAY 20
BEFORE THE HONORABLE PATRICIA C. FAWSETT,
AND A JURY
CHIEF UNITED STATES DISTRICT JUDGE
ORLANDO, FLORIDA

[TESTIMONY OF COOK]

* *

[165] A. 01-niner-5?

Q. Yes, sir. I think your military days are coming out. Are you there?

A. I am on page 195.

Q. And down at the bottom, do you see where it's promoting dealer locator?

A. Yes, I do.

Q. And you're telling us that the advertising is all done through the parent company West, right?

A. Marketing materials are prepared by West Corporation, yes.

Q. And did you get stock from time to time as an employee of West Interactive?

A. Yes, I did.

Q. So West, the parent company, is the one that runs what West, the subsidiary, does; isn't that right?

A. West Interactive Corporation is a separate corporation with a corporate president.

Q. And the guys that run West tell the president of West Interactive what to do, right?

A. Certainly in terms of budgeting and other things within terms of how the company does business with its clients, no.

Q. So here you have West, the parent company, promoting your dealer locator services, the ones that you do with Targus, right?

[166] A. Yes.

Q. And, by the way, did you know that Mr. Moore, one of the representatives of the defendants in this case, testified there was a partnership with Targus?

A. There is a contract between Targus and West Interactive Corporation to provide a specific type of service that we would call a reverse ANI match. And West Interactive pays Targus for that service.

Q. And West –

A. I've got to specify, that service has nothing do with dealer locator.

Q. But the question was about West. Isn't it a fact that West, the parent company, has a partnership with AT&T and Targus to provide call routing services through the West Interactive platform?

A. There is a contract between West Interactive Corporation and AT&T for providing support to like the dealer locator application.

Q. For Targus? The support you get is from Targus?

A. Specifically, for the dealer locator application, that would involve Targus. West is not involved in that contract.

Q. Now, I want to ask you about –

A. And further, I don't even know that a contract between AT&T or an AT&T client and Targus exists. I simply don't know that. That's – I wouldn't know that.

* * *

UNITED STATES DISTRICT COURT
MIDDLE DISTRICT OF FLORIDA
ORLANDO DIVISION

CASE NO: 6:02-CV-1354-ORL-19DAB

800 ADEPT, INC., a Florida corporation,

PLAINTIFF,

VS.

MUREX SECURITIES, LTD.,
MUREX LICENSING CORPORATION,
TARGUS INFORMATION CORPORATION,
and WEST CORPORATION,

DEFENDANTS.

THURSDAY, OCTOBER 12, 2006
CIVIL JURY TRIAL – DAY 13
BEFORE THE HONORABLE
PATRICIA C. FAWSETT CHIEF UNITED
STATES DISTRICT JUDGE, AND A JURY
ORLANDO, FLORIDA

[TESTIMONY OF E. LIVINGSTON]

* * *

[172] Q. So if you look at the second paragraph, it says, "Accordingly, no calculations whatsoever are necessary using the present invention as all that needs to be done is once the ANI is received the database is checked for the POTS for the particular ANI and then a call is immediately connected." Do you see that?

A. Yes, I do.

Q. Did you call that concept of immediately connecting the call direct routing?

A. No. Direct routing involves more than just immediate connection.

Q. But that was one of the characteristics of direct routing, wasn't it?

A. No, not as defined in the patent application or the patent, no. It may have been incorporated in that meaning, but it wasn't the only meaning of direct routing.

* * *

[209] Q. Do you agree, Mr. Livingston, that the elimination of the need for on-line calculation is implicit in the use of the database?

A. No. No, I don't agree. Database may have more than one table. There may be some calculations or some things that have to be done between the call being made and the call being [210] forwarded.

Q. Is the elimination of calculations implicit in the database?

A. No, it is not. In the lookup table at that time in the simplest embodiment of the 800 Adept system, yes, calculations were not required.

Q. Okay. In a lookup table of the kind the examiner drew and put as item 5A in Figure 1 is the elimination of calculations implicit in that database?

A. It's a matching system, depending on how you define calculations, but there was no point of distance, any distance calculations.

Q. So, the absence of distance calculations is implicit in a database of the kind the examiner drew as item 5A?

A. Well, that kind, yes. But a database can involve more than one table, and there may be some calculations that have to be made in that database.

* * *

TARGUS
INFORMATION CORPORATION

IntelliRouting Express™
User Guide

Version 1.3
June 2000

* * *

6.3.1 General Description of IntelliRouting Express™ Tools

TARGUS' IntelliRouting Express™ Tools are designed to help the client to manage a list of service locations and their attributes. For example, if a location's telephone number needs to be changed, the user will simply log on to a computer at their location that has the TARGUS Tools installed and has access to the TARGUS VPN directly via a secure internet connection.

After making the telephone number change, and following TARGUS' automatic update, calls will be routed to the new telephone number. TARGUS will automatically "geo-code" each store location by standardizing the address and attaching the correct Zip and latitude/longitude information.

Similarly, TARGUS' IntelliRouting Express™ Tools will allow the user to automatically add new locations. TARGUS IntelliRouting Express™ Tools will automatically standardize the address, attach the correct Zip+4, and attach a precise latitude and longitude to the new location.

For a detailed description on using IntelliRouting Express™ Tools please contact your TARGUS Information Corporation Sales Representative.

6.3.2 Radius/Distance-based Area Definitions

Maximum mileage "radius": A client may set up the system to find the nearest service location(s) to callers within "xx.xx" miles (xx.xx being a number defined by the user). In other words, the service area definition becomes a circle around each location, with the radius of that circle being defined by the user (see picture below [omitted]). Callers from within that circle will automatically be assigned to that service location "on the fly" with each telephone call. In cases of overlapping service areas the caller will be routed to the nearest service location or a list of service locations can be presented to the caller.

A client may define the mileage radius across all locations, or may customize different mileage radii for each location. For example, the user may set a mileage radius for Manhattan locations at 5 miles, but may set North Dakota locations at 40 miles, due to the fact the callers from North Dakota are more likely to drive up to 40 miles.

After a service area has been defined, a map will appear with the service location, as well as a circle, which outlines its maximum mileage radius. This map will include a detailed street map so that the user may view which parts of the area are covered by the service area definition.

* * *

6.3.3 Polygon Area Definitions

Irregular "polygon" service areas: In many cases, a client may need to define a service area to be something besides a maximum mileage radius (i.e. a circle). Many of our clients benefit from defining some or all of their service areas as irregular shaped polygons.

TARGUS *IntelliRouting Express*™ Tools provide the user with images of detailed street maps for the areas being defined. The precise boundaries for a location's service area can be defined by using the mouse to "point and click" the polygon's boundaries, you will define Callers from within that area will automatically be assigned to that service location "on the fly" on each telephone call. Changing the service area polygons will automatically change the routing. Changed polygons are made active during the nightly update. Polygons and/or maximum radius may be defined on a location-by-location basis.

* * *

UNITED STATES DISTRICT COURT
MIDDLE DISTRICT OF FLORIDA
ORLANDO DIVISION
CASE NO: 6:02-CV-1354-ORL-19DAB

800 ADEPT, INC., a Florida corporation,

PLAINTIFF,

VS.

MUREX SECURITIES, LTD.,
MUREX LICENSING CORPORATION,
TARGUS INFORMATION CORPORATION,
and WEST CORPORATION,

DEFENDANTs.

WEDNESDAY, OCTOBER 4, 2006
CIVIL JURY TRIAL – DAY 9
BEFORE THE
HONORABLE PATRICIA C. FAWSETT
CHIEF UNITED STATES DISTRICT JUDGE,
AND A JURY
ORLANDO, FLORIDA

[TESTIMONY OF LUCANTONI]

* * *

[172] Q. Dr. Lucantoni, can you explain to the jury what your role today is?

A. Yes. I have been asked to provide my opinions on whether the products and the services provided by Murex infringe the patents of 800 Adept, as well as determining if Murex and Targus have provided evidence that 800 Adept infringes their asserted claims.

* * *

[175] Q. Okay. And have you worked on switches that help us transfer voice calls from one area to the next?

A. Yes. One of my early projects was on something known as the number 5ESS switch. ESS stands for Electronic Switching System. And that is a very popular switch in today's telephone network. It is used both as a local exchange, something that can connect your telephone, that's how you would get into the telephone network, as well as what is known as a tandem switch. That's a switch in the network that only connects to other switches and does not have telephones. The 5ESS can provide both of those functionalities.

Q. We've also heard a lot of discussion in the many days we've been here about databases. Do you understand how the databases work in relation to the call routing technology that we're involved with?

A. Yes, I do. Databases are a fundamental part of call routing.

Q. Can you give the jury the benefit of some of your experience in how you utilize databases in call routing or telecommunications?

A. Well, the first project I was assigned at Bell Labs was something called AMPS, Advanced Mobile Phone System, which was the first cellular system in the country. I was tasked with enhancing the performance of handoffs. When you're driving down the road in a car, your signal is getting weak at one [176] cell tower and it needs to transfer to another. And when it gets to these towers, sometimes it needs to be rerouted to a different switch in the network. If you're talking to someone at their house, you've eventually got to get to a land-based network and go through the main network and be routed along that path.

The next project was 5ESS that I described. That actually uses a database called the NCP, which has also arisen in this case. My department worked on fundamental research and development on the NCP,. that's the Network Control Point, which is the database used by AT&T. We got down into very detailed levels of how the NCP works, how it handles queries, and how we should serve those queries to improve the through-put so we could handle more calls. So I was involved in that project.

And I've been involved in other projects involving databases, one at Motorola for the Iridium satellite system. It's a low earth orbit satellite system. I had some direct experience with database in that project

as well. And I should say that all of the telecom projects involved databases.

I was part of a technical due diligence team looking at a global satellite system where I traveled around the world consulting, and I was in charge of performance of the entire system. Part of that involved routing and interaction with [177] databases.

Q. Does that mean you sit down and type in all the lines of code we saw earlier from Ms. Wong?

A. No. I can program to a certain extent, but I basically program my mathematical algorithms that I developed. I really don't sit down and do database coding. I would be able to specify what a programmer would need to do to interact with the systems I'm involved with, because I have the big picture, just as I don't put chips on a circuit board or string lines between poles, I do understand how the systems work without typing in code.

Q. Have you authored any articles in the telecommunications field?

A. Yes. I have almost 60 published articles in peer-reviewed journals. Peer-reviewed means that it has to go through three or four people in the field, typically around the world, to review your articles, make sure they're technically sound and that there's something new that's worth publishing.

I've also presented these articles at conferences worldwide. I've presented on all six continents. I was

invited as one of two key speakers at a telecommunications conference in south Africa, based on some of my papers in Internet traffic.

* * *

[230] Q. And was that the end of the procedure, then?

A. No. It's the end of the procedure as far as the reexamination requestor is concerned.

Q. In this case, that would be who?

A. That would be 800 Adept.

Q. So, 800 Adept's out of the picture after this all 84 claims are rejected?

A. That's correct.

Q. Well, what happens next, then?

A. Well, then, the inventors can reply to the office actions, supply arguments to the examiner as to why the examiner's office action was not right. And, in cases like this, sometimes the examiner might make mistakes from that point onward. And the requestor, in this case 800 Adept, would have no further recourse during that process. They can't say to the examiner, you're misinterpreting this, let me give you another thing to consider. They're out of the picture. It's purely an interaction now between the original inventors and the examiner. And the examiner basically will need to take into account what the

inventors told the examiner that would eventually result in possibly some of the claims being accepted.

Q. And in this case, did Murex and Targus take advantage of this communication with the examiner?

[231] A. Yes, they did. There were private interviews held between the patent examiner and the inventors where 800 Adept was not allowed to attend to voice their opinion. They submitted the original application with arguments and documents that they thought should be considered, but they were not allowed to further explain that.

Q. Well, let me back you up. There's nothing nefarious about having that meeting, is there?

A. No.

Q. That's how it's normally done?

A. That's how it's normally done.

Q. But it's also normal that 800 Adept didn't have any input, correct?

A. That's correct.

Q. Okay. Now, the response filed by 800 Adept, do you see that in front of you?

A. Yes.

Q. And that's a response to the patent examiner saying all 84 claims or 83 of the 84 are rejected and the others are objected to, right? That comes later under my timeline?

A. Yes.

Q. And that indicates that they had the meeting with the examiner, right?

A. Yes. The last paragraph says, "The undersigned thanks the examiner for the courtesy extended during the personal [232] interview conducted on May 23rd, 2001."

Q. And does 800 Adept – I'm sorry, does Murex explain to the Patent Office what was described in that meeting?

A. I don't believe so.

Q. Is there references to how they characterized the Neville patent?

A. Yes, there are.

Q. Are they found within this response after the interview?

A. Yes.

Q. How did Murex describe Mr. Neville's patent to the Patent Office?

A. Murex described the Neville system as a fixed single table system.

Q. Did 800 Adept have an opportunity to rebut that argument?

A. No.

Q. Ultimately, the examiners changed their mind and permitted the claims to stand, correct?

A. Yes, they did.

Q. And if we can have the – well, let me back you up. When Murex was describing the interview and referencing what happened at the interview, do you see the page in front of you, the highlighted section?

A. Yes.

* * *

[242] Q. And the Patent Office says, "Claims 1 through 84 are liable over the applicable art of record. The subject claims provide use of the spatial key, which is found in master data tables, files, or database in association with the file or data number. The spatial key is used to look up corresponding destination telephone numbers in a client data table, file, or database. In contrast, the applicable art of record uses a telephone number to telephone number look-up in a single table or database." Was that the reasons for allowability?

A. That was the main reason that the examiner distinguished the '897 patent from the Neville invention, and that's in the reasons for patentability.

Q. And did you have to take that into account when you made your determination of whether or not there is infringement in this case?

A. Well, it's clear to me that the Neville patent covers more than one table. I think, Dr. Ranka gave a lot of clear testimony to why that's true. And if the patent says a relational database and a relational database is two or more tables, I did not take this into account.

Q. So, your opinion would have to disagree with the Patent Office?

A. Yes, it would.

* * *

[56] **[10/5/2006 Day 10 Transcript]**

[A.] Another feature of the 800 Adept patents is that it allows the dealers to define some pre-specified areas where they might serve. If you think of a bunch of Pizza Huts in an area, they probably have agreements where they draw franchise areas. So, if someone calls from this area, I will deliver there. If someone calls from this area, I will deliver there. So you can draw an actual boundary around a dealer – I'm sorry, I wish I could erase that.

I want to draw it around the dealer. And the 800 Adept patents allow you to route calls from callers who call from that area, so that's another feature that we'll get into later. But I think it was easier to illustrate on this drawing here.

* * *

Q. Okay. All right. What did 800 Adept come up with for their patent?

A. So again, they are trying to look at the issue of routing an 800 number to a potential dealer who may have many [57] different locations. And they want to route to the appropriate location. And the appropriate could be defined as the closest or the one who serves that caller, based on some arbitrarily-shaped delivery area. Again, the caller would dial a 1-800 number associated with a client that would be served by 800 Adept.

The Local Exchange Carrier would capture the calling number of the calling party, route that to the long distance carrier, just as we did before. And then, the long distance carrier would query a database, just like it does for any other 800 number. That database could be within the long distance carrier or it could be outside of the long distance carrier, operated by a third party where that platform or that database resides, either within or without – within or outside of the network.

It receives the WATS call, the 800 number, along with the ANI. I think we've heard that before, but let me write that down. So ANI is just short – I'll probably use that a lot, because it's common nomenclature. It's short for Automatic Number Identification, a service provided by the telephone company that sends the number from the caller's telephone into the network to be used by whoever needs it.

The patent allows for the database to take that ANI and determine which would be the appropriate POTS number to route it. And it would take into

account the dealer service [58] areas. It could take into account the shortest distance. Whatever criteria the customer wants, that database will perform its functions and send the appropriate POTS number back to the long distance company, at which point it becomes exactly what we talked about for the original 800 call that I illustrated.

That call is routed through the network to the appropriate dealer and comes out of the network as a POTS call. So, the Neville system or the system owned by 800 Adept is in the telephone network and performs a WATS-to-POTS translation, just as we have seen earlier.

Q. But does it get down to a finer degree of what we call granularity?

A. Yes. So –

Q. What does that mean?

A. The 800 Adept patents allow using the full ten digits, okay, so I'll call that ten-digit routing. Full ten digits allows you, if you have the information available, to get down to the level of the actual address, your street address, of where that phone resides. And it can use that location, possibly using something like latitude and longitude, and it can distinguish between your location, your house, and your next-door neighbor's, so it can really get down to a very fine granularity.

And it has the same information for the dealer. The [59] dealers have POTS numbers. They can give

the POTS numbers to a company, like 800 Adept, who can convert those. Or they may give the addresses themselves, which saves a little work. But those addresses would be what's known as geocoding, which assigns a latitude and longitude to that address. So, the 800 Adept database has all of the location information down to a very fine degree of accuracy, so it can pick the most appropriate dealer to route to.

Q. All the way down to the exact spot of the house?

A. Yes, all the way down to the address, for instance, of the house.

Q. Now, there has been some talk earlier in the trial about latitude and longitude somehow being the examiner's idea. Was it the examiner's idea?

A. Absolutely not.

* * *

[66] Q. Now, there's also been some discussions about the database and one table versus two table. Are you familiar with that in respect to the 800 Adept patents?

A. Yes.

Q. Can you explain to the jury the distinction between the two, if there is any?

A. Is the question in relation to the 800 Adept patents?

Q. Correct.

A. Well, the 800 Adept patents, as was discussed at length, deal with relational databases, which are by definition a number of databases linked together by keys. I think Dr. Ranka explained that quite well and gave an example that we can all understand, the tv guide multi-table system. Since the 800 Adept patents cover relational databases, there's really no distinction. It can cover single table, cover multitable, it's even more general than that.

[67] Q. And there was some discussion about one table being inside the system and one table being outside the system. Does that make any difference in your analysis of the 800 Adept patents?

A. Not at all. In fact, I was thinking about that. And the example that Dr. Ranka gave with the tv guide, I think it's very simple to illustrate that concept. The example he gave out of tv guide with a grid that might have a movie name, you would go to the back of the book and look for the description of the actors.

Think about a weekly publication that you might get at home, a free publication, that would have a prime-time group with just the name. There's no descriptions anywhere in that publication. Well, you could go to your local Barnes & Noble. Let's say you saw the movie, "Meet the Parents," and want to list it and you can't remember who starred in it.

So you go to Barnes & Noble, get the book, the Leonard Multan review book, the 20,000 movies off the shelf, look up "Meet the Parents" and see it's

Robert De Niro and Ben Stiller. These are two separate things, one you get at home, one in a book store. They're both created by different companies.

They're maintained and updated by different companies, but there's a link between them, which is the name of the movie. And the mechanism for linking those in that [68] case is you go to the book store and look at it. In these systems, these databases, whether they're around the world, they're connected by some type of communication technology that allows the linking to occur.

* * *

[78] A. Yes. On the top part of the picture we have a caller representing the original telephone that I had drawn on my screen making a call to an 800 number that is owned by a Targus customer, say American Motor Club we heard about the other day, for instance. Well, let's think of a pizza location. You're dialing 1-800-My-Pizza, and you want to be routed to the location that will deliver to you.

The call comes in to the telephone network. In this figure, we see LEC/LDC, so this box would include all the components of the telephone network that I had drawn in the big cloud. And at one of those places, it recognizes that this call is handled by the platform. The next rectangle down is a platform that could represent the rectangle that I drew representing West, but it could be any other Targus customer platform.

Q. Okay. Would platforms include West, Vail, Patriot, all those we've talked about?

A. Yes.

Q. All right.

A. Now, the legend on the bottom right shows the darkened blue arrow as representing the actual voice call. That's the call that's being set up from the caller to the appropriate dealer. The next one down – I can't read the screen – okay, the solid black arrows are a data channel. We'll come to the [79] dash arrows in a minute, and there's a dot representing computer processing.

Okay. So it shows a data channel, a black arrow, coming from the LDC to the platform. That's representing a signaling channel where signaling information is sent to the platform. That information can be, as it's shown here, ANI and DNIS. ANI, we've discussed as Automatic Number identification, which represents the number being called from.

DNIS is a service also provided by long distance companies. That stands for Dialed Number Identification Service. It basically represents the number that was dialed. Did you dial 1-800-My-Pizza or did you dial 1-800-Go-Ryder? This platform is getting the call. It needs to know what number did the caller dial.

When the platform gets the information, it recognizes that this number, the information for routing this number, is performed by the Targus database. So

it needs to then send a query, a normal database query, to a database to get a response. The response in the intellirouting example, Intellirouting Express, could be the telephone number to route the call, the regular POTS number that I illustrated earlier.

It could be other information, like hours of operation that could be played back to the user, but for the functionality that we're interested in here is getting the actual phone number so the original voice call can be routed.

[80] So at that point, the platform which sends an information to the Targus computers where the database resides, that information would also include the ANI and the DNIS, and it would include request ID, which says I want Intellirouting Express service. Yeah, it says telephone number, but that's basically captured in the ANI and DNIS.

Now, the Targus Information computers take that information, the ANI and the DNIS, and it wants to determine the appropriate dealer to send it to. So, first it goes to what they call a master table. This is the first of several tables that are all pre-computed.

They have stated that this master table contains all published and unpublished phone numbers. It is a table that maps the ANI, the number you're calling from, to a zip plus four. So, this is pre-computed with all of the ANIs published and unpublished, mapping those to zip plus fours. They also have a default mechanism analogous to predominance that assures that they can route to all callers.

And that default mechanism is – for some reason someone calls with a ten-digit number that is not in their database, they would assume that caller is calling from the central office that they are connected to. So they would default, basically to a six-digit routing to make sure that they route all calls.

MR. VARE: Objection, Your Honor: Move to strike [81] the last line of testimony as lacking in foundation. Again, he's using the word predominance. I know he wants to use the word predominance. He should have used it in his report.

* * *

Q. You can continue.

A. I state that default mechanism, as described in my report and also described in Mr. Shaffer's, I believe it was a declaration –

Q. Well, let's just not use the word.

A. Okay. So, once you have the zip plus four, now you want to know where is that from a location point of view. One of the alternatives is to use a third-party file that they have bought Geographic Data Technologies, I believe, GDT file, that is a pre-computed file that contains all of the zip plus fours in the country and the appropriate latitude and longitude of the centroids of those.

So now we have – this is a link, a standard key, from a first table to a second table, just has the very simplest relational database that Dr. Ranka showed.

You have an ANI coming into one table. It looks up a zip plus four in that second column. It uses that as an index into a second table where now the first column is a bunch of zip plus fours. It finds that zip plus four in the first column, and next to [82] that would be a latitude and longitude. So now, we've mapped where we have essentially associated for each originating telephone number a latitude and longitude.

The next step is to compute something they term is a window key. I'm going to try to explain this. One possibility would be to take every possible latitude and longitude and have a table for the My Pizza company that had all possible latitudes and longitudes in the first row and the dealer numbers that would serve those in the second row.

But you can imagine if the latitudes and longitudes are many digits long and represent areas down to a household that that table would be way too large to handle. It would be millions upon millions, billions of numbers. So, they want to reduce the size of the client tables that they're going to need. So, one way of doing that is to truncate or cut off some of the tailing digits that give you more and more accuracy to a smaller number of digits.

The method they use is to take the latitude, which might have eight decimal digits, and truncate that to three digits. And then they take the longitude, truncate that to four digits. I realize this sounds technical, but I think you'll understand in a second.

What they've done is opened up or made the resolution less fine. And the three digits of latitude and four digits of longitude, at that level of accuracy, basically [83] represents a six-mile by six-mile grid. So, just think of the United States and you just draw a bunch of vertical lines and horizontal lines where the distance between those lines is six miles.

What they do is they take that truncated latitude and longitude, concatenate those, as Dr. Ranka mentioned, and put them into a seven-digit number. You now have one number seven digits long that they call a window key. And any caller that calls with a latitude and longitude in that six-mile grid, once you truncate or cut off those last digits, they would all have the same first three latitudes and first four longitudes, they would all have the same window key.

So, this is all pre-computed. Now, what do we have? We have a relation that takes an ANI and gives you a window key. This is all pre-computed, stored in your system, and handles all potential callers because of a default mechanism. Its all pre-computed.

Now, at this point the platform would use the DNIS, which is the number dialed, and say, oh, this person wants the My Pizza company, so it has a separate table for the My Pizza company that the company has supplied Targus with all their potential locations. Here are the buildings that I have operating my pizza company, and these are the areas that I want to serve or to deliver to.

So, now we have the client location file. And what [84] that does is it indexes for this particular client now that My Pizza company has a client location file that it's indexed by a window key. So now, along all the rows, we have all these potential window keys. Now, remember, it's much fewer rows than you would need if you had all possible digits for latitudes and longitudes.

Now, what they want is from that window key which dealer is appropriate. But as you see, the resolution is a six-mile by six-mile grid. There could be a number of dealers in there, and there could be a number of dealers that would be the appropriate one to route to this caller.

So, what they have also pre-computed is that for each window key, they will find all dealers who are somewhat close to that window key. I think I could – I mean, I can describe that in more detail, but I think that's not relevant at this point. We have a window key with a number of potential dealers. Any one of those dealers could be the appropriate one. That's all pre-computed.

So, what we have is a pre-computed database that maps an ANI into a small number of dealers that's pre-computed. What they do when an actual caller calls in, they take that ANI, the ten-digit number, they go through the database and end up with a few dealers to pick from. Now, they want to do a calculation that will actually determine the appropriate one.

[85] So, now they go to the actual latitude and longitude, the original full resolution latitude and longitude that they originally truncated, and now they're going to use it down to the level of a side of a street, potentially. And they are going to use for each of the dealers in that row, indexed by the window key, there will be information on whether that dealer, a particular dealer, has a radius, a circle around it, that says I will deliver to any one within three miles of me or they will have a polygon, a boundary, or a franchise area that has been drawn.

And if there's a polygon, that information would be also contained in their client location file. And they will take the ANI, the actual location, the real location of the ANI down to a zip plus four level and do some real-time calculations to determine which of those several dealers are the appropriate one. It could be the closest. It could be the one that has a franchise area that delivers to it, or if there are several that that are in the radius or polygon-shaped franchise area, they may take the closest of those.

So, in any case, they take the several dealers that are possibilities, do some type of on-line calculation to choose the appropriate one. And then, also in that database for each of those dealers are information, such as the POTS number, the actual phone number of that dealer. If you were [86] nearby the dealer, you would dial the local number or area code number to get to that dealer. That information is there. They might have additional information like hours of operation.

Whatever the platform requested would then be returned. And, typically, they return the phone number that comes back to the platform. And now, the platform can continue adding. You see the blue arrow? It's continuing. You see the original voice call. It's been paused at the platform. That terminology has been used describing the figure. The call is parked while it's waiting to find out where it needs to go to initiate the call.

That voice call then continues back through the network routing – this is just a rectangle, but it's going to be a lot of switches that I had drawn. It needs to get a path. At that point it's just as if the caller had dialed that POTS number. It just gets routed to the appropriate store.

Q. So, the caller would dial the number, all this would happen, and the caller wouldn't know what happened, other than the phone rings on the other end?

A. That's correct. And relating this to my figures, this is just a WATS-to-POTS conversion. There is a 1-800 number coming in, there is a WATS-to-POTS conversion, which says route it to this actual telephone number, and then it [87] continues routing that POTS call, just as I have shown in several figures.

Q. Are you familiar with the Murex-Targus product known as Location Express?

A. Yes.

Q. And can you describe to the jury generally how that works?

A. Yes. Now, we've seen Intellirouting Express. Location Express is actually very simple. When the platform gets an 800 number, they request ID. They could request a service provided by Targus called Location Express. Location Express would typically return to the platform either the zip plus four of that ANI.

Remember, the ANI comes into the platform. The platform doesn't know where that ANI is. So, its not going to ask for the final number of the dealer. It just says where is this ANI. And that ANI could be described either by the zip plus four, associated with that ANI, or the latitude and longitude.

So the same path is followed. And you see after this GDT file, there's that light gray dash line that's determined by the computers, then sent back. That will either be the latitude and longitude or the zip plus four. So that information comes back to the platform.

* * *

[88] Q. Are you familiar with how Targus and Murex creates their database?

A. Yes.

Q. Can you explain to the jury how they go about that?

A. Yes. I think, I need to refer to my report. The [89] information for this came both from technical documents provided by Targus, as well as the analysis by Dr. Benjamin Goldberg, who I had mentioned yesterday as a source code expert. He actually looked at code and described to me what they do.

Q. All right. Well, rather than going through that, do you have a sufficient understanding in order to give an opinion as to infringement on the database creation claims?

A. Yes.

Q. Okay. I want to turn you, then, to the '111 patent in claim 29. Claim 29 begins, "A method for direct routing a telephone call from a first party who has an originating telephone number and a physical location and who dials a telephone number, including digits uniquely characteristic to a second party, having a plurality of service locations, said method comprising the steps of . . . " Does Targus, Murex, and West direct route a telephone call?

A. Yes, they do.

Q. The next step is – or the first step is "allocating latitude and longitude coordinates to the physical location of all potential first parties." Do you see that?

A. Yes.

Q. Does Murex and Targus allocate latitude and longitude coordinates to the physical locations of all potential first parties?

[90] A. That's correct. That's the first two tables that I described in the figure where you start with an ANI, get to zip four, get to lat-lon. So, each ANI or all potential parties, once we factor in their default mechanism, is assigned a lat-lon.

Q. And the next step is "defining the boundaries of one or more geographic areas which can be of any size or shape according to pre-determined criteria, each point along said boundaries being defined by latitude and longitude coordinates." Does Targus and Murex's products do that?

A. Yes, they do.

Q. The next step is "assigning to the physical location of said potential first parties a telephone number of a service location of a second party that will receive calls originating from within the boundary of a geographic area in which the latitude and longitude coordinates of the physical location of each of said potential first parties lie." Does Targus-Murex do that?

A. Yes.

Q. And then, the final step is "directly routing – " did I skip one?

A. Yeah, you skipped one.

Q. I'm sorry. I hate to get ahead of myself. The next step is "determining the originating telephone number of the first party from which said telephone

call is to be routed." [91] Does Targus and Murex do that?

A. Yes, they do.

Q. Is that capturing the ANI?

A. That's right.

Q. And then, finally, "directly routing said telephone call to a service location of the second party assigned to said originating telephone number of the first party by said step of assigning." Can you explain whether Targus, Murex, and West does that?

A. Yes, they do.

Q. And did you perform this step-by-step analysis for each of the Murex-Targus products and the West routing system to come up with your opinions that we described earlier this morning?

A. Yes, I did. For each of the scenarios that we described, the routing scenarios, DART Location Express, Intellirouting Express, I specifically show where in those services these particular elements were performed on an element-by-element basis.

Q. And if I were to go through each and every claim that you asserted infringed, would you find those elements in the Murex-Targus products?

A. All of the claims that I have claimed infringe, I have analyzed element by element, and they all exist.

* * *

[182] Q. What type of evidence would you rely upon?

A. The most solid evidence is source code, which is why I asked Dr. Goldberg to look at source code and map up what is actually implemented and what this system does through the claim elements. I rely on the testimony of what is known legally as a 30(b)(6) witness.

What that means, my understanding is that is a person who has the authority to speak before the company and that if such a person says we do this, you can take that as a fact. And that's why I relied on Mr. Shaffer's declaration with that figure that I walked through for the Location Express and Intellirouting Express, because they had a description of what they did. I was able to map that directly on to the claim elements.

* * *

[185] Q. And based upon your investigation, you're of the opinion of that the Murex, Targus, and West process infringes the patents?

A. Those processes and applications and clients infringe the particular claims that I said are infringed.

* * *

UNITED STATES DISTRICT COURT
MIDDLE DISTRICT OF FLORIDA
ORLANDO DIVISION

CASE NO: 6:02-CV-1354-ORL-28DAB

800 ADEPT, INC., a Florida corporation,

PLAINTIFF,

VS.

MUREX SECURITIES, LTD.,
MUREX LICENSING CORPORATION,
TARGUS INFORMATION CORPORATION,
and WEST CORPORATION,

DEFENDANTS.

WEDNESDAY, OCTOBER 25, 2006
CIVIL JURY TRIAL – DAY 21
BEFORE THE HONORABLE
PATRICIA C. FAWSETT, AND A JURY
CHIEF UNITED STATES DISTRICT JUDGE
ORLANDO, FLORIDA

[TESTIMONY OF O'KELLY]

* * *

[170] A. The example that comes to mind, and I'd have to read through the entire chart, is the Paint Job update program, which is further down. It's not of the '897.

Q. Paint Job was an off-line table build, sir. Paint Job was not implemented at the platform using any kind of linkage; isn't that a fact?

A. What I'm doing here is citing these under the appropriate patents. So in this particular case, the '608, which is an automatic table build, claim –

THE COURT: You were asked about the '897 patent.

BY MR. MILBRATH:

Q. Just give me a specific application, sir, if you conducted an honest investigation and surely you'd be able to find this one, show us a specific application where you have shown in your report that 800 Adept linked to a client table while a caller was on-line to dynamically link the caller number to a service location in accordance with the '897 patent.

A. I would have to review this in much greater detail.

Q. It's not there, is it?

A. As I say, I could take a lot of time and, as you say –

Q. This is your time, sir. That's why you're here after all these five years of being a well-paid expert.

A. The analysis that I performed correctly identified the aspects of CentraBase that aligned with the claim elements as [171] I described in my report this morning.

Q. So for claim 69, the element that requires linkage by a spatial key, you can't show me a single example where McLeod or anywhere else in the 800

Adept system there was dynamically linking while a caller was on the line a master and a client table; isn't that a fact?

A. That's not a fact.

Q. Show me in your report where it is.

A. If we could go back to Exhibit 45, the marketing letter that we talked about has a specific great box that shows the potential to link. Whether they did or not is immaterial to the fact that it is an offer for sale –

Q. I know you want to say it's an offer of sale. Are you aware under federal circuit case law there's no offer of sale within that statute, unless there are prices associated and it's a specific offer?

MR. KNEBEL: Your Honor, he's not here as an expert on federal circuit law.

THE COURT: Well, the witness offered an opinion in the area. State the question again.

BY MR. MILBRATH:

Q. Are you aware that under the case law by which you are governed, if you're going to offer opinions on offer of sale, there has to be a price associated with a particular offer for to qualify as an offer to sale a patented invention; yes or [172] no?

A. No, I'm simply unaware of that.

Q. So apart to where you want to retreat to Exhibit 45, I want you to tell me a specific example where there was ever a time the master client linked at 800 Adept. This is your last chance on this, in your report.

A. In my report. Well, let me continue to look through there. I reviewed a great deal of material and, as you saw, I listed several products. On the spot here, I cannot name the one, but I can tell you that I diligently reviewed CentraBase and understood that its capability to do that linkage by the zip plus four.

Q. All right, Dr. O'Kelly. In the interest of time, I'm about to run out of time, I'm going to ask you about the '810 patent.

A. Yep.

Q. The first element is a master list of caller telephone numbers indexed by a telephone number. Each telephone number having a spatial key corresponding to a location of a telephone associated with a telephone number, right?

A. Correct.

Q. And you've told the jury that if we go back to Exhibit 45 that the master table would be that phone number of the ANI with the latitude field and a longitude field and a zip four all in a single table, right?

* * *

UNITED STATES DISTRICT COURT
MIDDLE DISTRICT OF FLORIDA
ORLANDO DIVISION

CASE NO: 6:02-CV-1354-ORL-19DAB

800 ADEPT, INC., a Florida corporation,

PLAINTIFF,

VS.

MUREX SECURITIES, LTD.,
MUREX LICENSING CORPORATION,
TARGUS INFORMATION CORPORATION,
and WEST CORPORATION,

DEFENDANTS.

FRIDAY, OCTOBER 6, 2006
CIVIL JURY TRIAL – DAY 11
BEFORE THE HONORABLE
PATRICIA C. FAWSETT CHIEF UNITED
STATES DISTRICT COURT JUDGE, AND A JURY
ORLANDO, FLORIDA

[TESTIMONY OF MOORE]

* * *

[34] Q. All right. While we're on that subject, if we can think schematically for a minute. The market that Targus was in, as far as it pertained to telephone call routing, was you were a solutions provider; isn't that correct?

A. We were a database company. What we invested in was the platform that we had and a

network that all the other platforms could talk to, and they would generate a query to us or a message and say I want this piece of information from your platform. So, our business model was very different from, for example, Adept. We were a database provider without a platform.

* * *

[174] Q. Of all of those multiple patents, if we're trying to drill down to what you're really claiming, almost all of those patents require a spatial key linking a master and a client table or a master and a client and other multiple tables for the purposes of routing a call, right?

A. No, sir. In fact, today we primarily practice with patent number '214 that does real-time calculations and doesn't require a look-up using the spatial key.

* * *

UNITED STATES DISTRICT COURT
MIDDLE DISTRICT OF FLORIDA
ORLANDO DIVISION

800 ADEPT, INC., a Florida corporation, Plaintiff, v. MUREX SECURITIES, LTD., an Isle of Man limited company; MUREX LICENSING CORPORATION, a Delaware corporation; TARGUS INFORMATION CORPORATION, a corporation; and WEST CORPORATION, a corporation, Defendants.	)	NO. 602-CV-1354-ORL-28DAB
AND RELATED CROSS-ACTION.	)	

CONFIDENTIAL PORTIONS AT PAGES 48-67, PAGES 131-144 AND PAGES 154-212
DEPOSITION OF DOUGLAS LIVINGSTON
TAKEN ON: THURSDAY, NOVEMBER 10, 2005
TAKEN AT: 750 B Street, Suite 2100
San Diego, California
REPORTED BY: Florinda St. Cyr
CSR No. 10180, RPR

* * *

[43] BY MR. GILCHRIST:

Q. Can you explain to the jury what you mean by feeling strong-armed?

MR. HEJMANOWSKI: It was your term. That's why I'm laughing. I'm sorry.

MR. GILCHRIST: Not quite. It was his term. But –

Q. Let me ask you a predicate question. Did you ever use that term, "strong-armed" into making the change?

A. I don't recall.

MR. VARE: Do you mind if we take a fairly [44] short break?

MR. GILCHRIST: Absolutely.

(Recess taken.)

BY MR. GILCHRIST:

Q. Do you recall communicating with Mr. Herb Allen of my law firm?

A. Yes.

Q. And was that fairly recently?

A. Yes.

Q. How did that come about?

A. We – I received a letter from Mr. Allen.

Q. And he responded to that letter?

A. That's correct.

MR. GILCHRIST: Todd, are you numbering consecutively or each –

MR. VARE: I'm sorry, what?

MR. GILCHRIST: Are you numbering consecutively or each deposition starting anew?

MR. VARE: That's up to you. I think you've been all over the place. We've numbered consecutively.

MR. GILCHRIST: Okay.

MR. VARE: But you've numbered exhibits by the witness or sometimes just starting with 1.

MR. GILCHRIST: Okay. Then I'll start all over again as well. This will be Livingston Deposition [45] Exhibit 1.

(The document was marked as Plaintiff's Exhibit 1 and is made a part of this deposition.)

BY MR. GILCHRIST:

Q. I guess it better be Doug Livingston Exhibit 1, since we have more than one Livingston involved. I'll hand you what I have had marked as Exhibit 1 and ask if you can identify that document.

A. Yes.

Q. Is that the letter that you sent to Mr. Herb Allen?

A. Yes, it is.

Q. And if you'll look down at the bottom of that letter, you indicate that you were not pleased with the manner that Targus strong-armed Patriot Communications, Enterprise Rent a Car and McLeod into licensing arrangements.

A. That's correct.

Q. Can you explain to me what you mean by that?

A. Exactly that. In the process of evaluating Targus and getting sued, we were not pleased with the way in which it occurred.

Q. What about it made you displeased?

A. We were in the process of negotiating an [46] arrangement with Targus, and we got sued for – got sued by Targus or Murex well into the negotiation process.

Q. And it's your opinion that lawsuit was designed to force you to make the change?

A. Yes.

Q. Did it in fact force Enterprise and Patriot to make the change?

MR. VARE: Calls for speculation.

MR. GILCHRIST: Let me break it down into two different people.

Q. Did it in fact force Patriot to make the change?

A. Yes.

Q. Did you have any communications with Enterprise about the lawsuit and the change?

A. Yes.

Q. Is it your opinion that Enterprise was also forced to make the change as a result of the lawsuit?

A. Yes.

Q. And what do you base that upon?

A. Communication and discussion with Enterprise and McLeod.

Q. And as a result of the changeover, were you provided a license under the Murex/Targus patents?

A. Patriot, no.

[47] MR. GILCHRIST: Todd, are the terms of that lawsuit agreement confidential to the point where I have to ask my client to leave?

MR. VARE: I believe so.

BY MR. GILCHRIST:

Q. I'll be asking you a series of questions about the terms of that settlement agreement. Do you have

any independent recollection of what those terms were?

A. Yes.

MR. GILCHRIST: Juan, you have to leave for a moment.

(At this point, Juan Sierra left the deposition proceedings.)

(The following pages contain confidential material, subject to Court Order, and are bound separately.)

* * *

[209] Q. Do you agree, Mr. Livingston, that the elimination of the need for on-line calculation is implicit in the use of the database?

A. No. No, I don't agree. Database may have more than one table. There may be some calculations or some things that have to be done between the call being made and the call being [210] forwarded.

Q. Is the elimination of calculations implicit in the database?

A. No, it is not. In the lookup table at that time in the simplest embodiment of the 800 Adept system, yes, calculations were not required.

Q. Okay. In a lookup table of the kind the examiner drew and put as item 5A in Figure 1 is the elimination of calculations implicit in that database?

A. It's a matching system, depending on how you define calculations, but there was no point of distance, any distance calculations.

Q. So, the absence of distance calculations is implicit in a database of the kind the examiner drew as item 5a?

A. Well, that kind, yes. But a database can involve more than one table, and there may be some calculations that have to be made in that database.

* * *

UNITED STATES DISTRICT COURT
MIDDLE DISTRICT OF FLORIDA
ORLANDO DIVISION

800 ADEPT, INC., a Florida corporation, Plaintiff, -vs- MUREX SECURITIES, LTD., an Isle of Man limited company; MUREX LICENSING CORPORATION, a Delaware corporation; TARGUS INFORMATION CORPORATION, a corporation; and WEST CORPORATION, a corporation, Defendants.	No. 6:02-cv-1354-Orl-28DAB VIDEOTAPED DEPOSITION OF JAMES WHITELEY 11/22/05

[TESTIMONY OF WHITELEY]

* * *

[6] Q. Mr. Whiteley, give us your full name, please.

A. James Russell Whiteley.

Q. Are you president of Vail Systems, Inc.?

A. Yes.

* * *

[8] Q. Do you recall now that Vail Systems, Inc., was sued in this case by Murex Securities, Ltd.?

A. Yes.

Q. And Murex Licensing Corporation?

A. I'm not certain of the distinction, but certainly we were sued by Murex Securities.

Q. And were you aware of that lawsuit when [9] it was filed?

A. Yes.

* * *

[10] Q. Well, was there some resolution of the claims made against your company?

A. The claim was discharged.

Q. Was dropped?

A. Was dropped.

Q. And why was it dropped?

A. Because I called – I believe I contacted a George Moore and indicated I thought it was strange that we were being sued.

Q. Because you had a contract relationship with Moore's various companies, Targus, Murex Licensing and the like, right?

A. I had a contract relationship with Targus Information Services.

* * *

[11] Q. But in this case, in the counterclaim, you were sued for patent infringement by companies you associate with Moore; isn't that so?

A. That I associate with Moore, yes.

Q. All right. You called Moore and you said you thought it was strange you were being sued, your company?

A. Yes.

Q. And why was that?

A. Because we were contracting for the information and that our client was, so if the issue was – if he had an issue, it seemed to me to be with the client, not with us.

Q. Your client was who?

A. Our client was Allstate Motor Club.

Q. So what did Mr. Moore say when you brought that to his attention?

A. He said he would look into it and take care of it.

* * *

[12] Q. And so was there a demand made to your knowledge on Allstate Motor Club for indemnification of the claims made by the Murex Companies?

A. I'm not certain what a demand is.

Q. Well, do you recall somebody communicating at your direction to the motor club that they had signed an indemnity?

A. I believe my attorney did that.

* * *

[13] Q. So you never spoke to Al Dyon about that?

A. No.

It's a legal matter. It's being handled through my attorney.

Q. And so what happened after Allstate indicated that it was not excited about the request for indemnification?

A. I think the next thing that happened is I was informed by, I believe it was, George Moore that the – that Vail Systems was being removed [14] from the – from the – from the – from the – being defendant in the case.

* * *

[21] Q. Okay. So did there come a time that you, yourself, looked at these patents that you were sued for infringing to see whether you believed that you were infringing?

A. I dismissed the issue as saying that it wasn't obvious to me that we were infringing, but I didn't – you know, I wasn't – I wasn't particularly concerned because – because we were working at the direction of, in this case, Allstate Motor Club.

Q. Did you ever have any meetings with anyone at Allstate Motor Club about these patents that were asserted against Vail?

A. No.

* * *

[22] Q. So if we were to reconstruct events, would it be accurate to say from roughly 1996 up until the time the lawsuit was filed by your vendor, Mr. Moore's companies, you had been talking to AMC about replacing 800 Adept with Targus, right?

A. I'm not even sure I had mentioned Targus' name specifically, but I certainly had talked about doing routing in different – in different ways.

Q. Did you have an exclusive relationship with Targus as early as 1997?

A. Yes. Targus provided – we provided services to Targus customers, I believe, in that time frame.

Q. And when you say you provided services, you mean call flows and platform services?

A. Yes.

Q. And Targus supplied to you the databases?

A. Targus provided us with an online service where we would access that online service with a – with a telephone number, and they would [23] return data of various forms to us.

Q. And was that referred to as a dip?

A. That would be generally referred to as a dip, yes.

Q. So every time you would dip into the Targus database, there would be a charge associated with that?

A. That's correct.

Q. And that went on from 1997 to the present, right?

A. Yes.

Q. So during that period of time, in 1997 to the present, most of your call-routing database services were coming from Targus; is that right?

A. Well, between Allstate and – between Allstate and Targus, yes.

I'm sorry, between – most of the work was coming from – most of the mapping was coming from Targus, but some was being provided through Allstate Motor Club, which was information provided by 800 Adept.

Q. In your declaration in paragraph five, . . .

* * *

[24] Q. So, roughly, from the 1997 time period forward, you had an exclusive relationship with Targus for call-routing related databases, except for the AMC account; wouldn't that be correct?

* * *

[27] Q. And during that period of time, you attempted to persuade AMC to switch from 800 Adept to Targus, right?

A. No, I continued to do what's the best thing for my customer, which was Allstate Motor Club, to improve the efficiency of the system that they were using.

Q. I don't think that answered my question.

Did you or did you not attempt to persuade AMC to change from 800 Adept to some other supplier for data?

A. There were a number of alternative ways to get data, yes.

Q. And so you suggested to the motor club, "You should replace 800 Adept", yes or no?

A. I suggested to the motor club that other kinds of routing would be appropriate.

Q. And you suggested Targus in that connection, didn't you, as a vendor?

A. Early on, no.

Q. Well, how about the 2001/2002 time frame? Didn't you attempt to persuade the motor club that they should use Targus for their database services for call routing?

[28] A. Certainly – certainly, the mapping of calls from – from a telephone number to a zip code

can be provided by a number of people, including Targus, sure.

Q. And you suggested that to the club, didn't you, motor club?

A. I suggested that they change that mapping, yes.

Q. And you suggested Targus was one source for changing the mapping?

A. I'm sure it came up in conversation, yes.

I'm not sure any documents were ever written to that effect.

* * *

[30] Q. So is it merely a coincidence that the contract relationship between 800 Adept and the motor club was terminated as a result of this lawsuit where you were named as a party by the very company that you were attempting to sponsor as an alternative supplier?

A. I don't know what it is. All I know is what I know.

Q. And what you know is that AMC ended up switching to Targus, right?

A. Yes.

* * *

[182] Q. But you did try to persuade the people at AMC to switch from 800 Adept to some other provider like Targus, right?

A. I – I tried to convince All – Allstate that there was advantages in going directly to a zip-code-based routing.

[183] Q. And you were not successful initially in persuading them of that; were you?

A. Wasn't successful at all.

Q. Until the lawsuit was filed against you or your company?

* * *

[184] Q. Well, you've already said it was pretty strange for Targus to be involved in suing you when you were doing so much work for Targus, right?

A. Exactly. Well, it wasn't Targus. It was Murex, but yes.

Q. But you knew Moore ran both companies, right?

A. I didn't know that for sure, but I could assume that. That's why I called George Moore and said, "What the hell are you doing?"

* * *

[185] Q. Now, how many systems – how many 800 customers were you servicing for call routing at

the time that Vail was named as a defendant in the case?

A. We probably – well, call routing?

We probably maintain over two thousand or three thousand 800 numbers. Those will be spread across a few hundred customers.

Q. How many of those few hundred customers had come from Targus?

[186] A. Approximately – from Targus?

Targus represents approximately twenty-five percent of our business.

Q. So let me see if I understand this.

* * *

[238] Q. So did – was there ever a time that you made any joint presentation with anyone at Targus to anyone at AMC about the benefits of switching to Targus?

A. Never.

Q. Did I just ask that question wrong?

Should I ask – I mean, was there ever a time when you made a presentation to AMC where Targus came up?

A. I mean, there were cases where – where I was talking to some people at AMC about how we [239] can increase the efficiency of the overall system, and they were just as interested in saving – saving,

you know, $3 to $4 a call than anybody, and so I would imagine in those cases we talked about how – I know we talked about how to do routing differently, and I know that they weren't that interested in changing, and they weren't that interested in changing up until the – the – the call my esteemed attorney made to Allstate's attorney.

* * *

Contract No. 95-0205

CONSULTING AGREEMENT

THIS CONSULTING AGREEMENT, made as of the 15th day of August, 1994, between FEDERAL EXPRESS CORPORATION ("Federal") and TARGUS INFORMATION CORPORATION ("Consultant").

* * *

Section 13. Ownership of Documents. (a) Consultant agrees that all formulae, processes, machines, compositions of matter (or improvements thereof), computer programs, know-how, discoveries, techniques, drawings, specifications, renderings and all other documents, data and materials ("Materials") in any way related to the Work produced by Consultant for Federal pursuant to this Agreement shall be the sole property of Federal and shall be delivered to Federal upon its request but in any event upon the expiration or earlier termination of this Agreement.

(b) Consultant hereby assigns to Federal any right now held or hereafter acquired by Consultant in the Materials including, but not limited to, any copyright, patent or other statutory or common law protection. Consultant agrees to assist Federal in every proper way to obtain and, from time to time, enforce any copyrights, patents or other statutory or common law protections for the Materials, including but not limited to, the execution of all documents necessary for Federal to apply for and obtain such copyrights, patents and other statutory or common law protections and enforcing the same, together with

any assignments thereof to Federal. Consultant agrees that the obligations stated under this Section 13 shall survive the expiration or earlier termination of this Agreement.

* * *

April 22, 1992

Gina K. Marks
Account Executive **[CONFIDENTIAL]**
Equifax National Decision Systems
539 Encinitas Boulevard
Encinitas, CA 92024-9007

Dear Gina:

This letter is to serve as a commitment between Pizza Hut of America, Inc. ("Pizza Hut") and Equifax National Decision System ("NDS") to compile a database for the Pizza Hut Jacksonville Market office for the One Number program ("Program").

NDS will assign one project leader to the Jacksonville DB creation and may have the project leader in Jacksonville for the start of the use of the database. NDS will work with Pizza Hut to reach 4% call misroute goal. NDS will have the Jacksonville Market completed by May ~~11~~14(*), 1992. The process for compiling the database consists of the following steps by NDS:

1. Obtain three separate lists for the Jacksonville Market. The consumer and business lists will be provided by NDS and the customer list will be provided by Pizza Hut. NDS will match Pizza Hut's digitized trade area against the NDS in-house

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(*) Contingent upon Pizza Hut's customer list delivered in usable format at National Decision System's Encinitas, California office by Friday, May 24, 1992.

business assigning Unit number. NDS has digitized all 17 Pizza Hut trade areas.

2. Provide a sample tape containing 10 to 20 records to test format and layout of tape. This will be done within 10 days of the execution of this letter of commitment.

3. Upon receipt of all the lists, perform the following functions:

a. Address Standardization – This will allow for the files to have the same spellings for street names (i.e. 1st or first). This will increase the accuracy of the merge/purge of our file and the Pizza Hut customer file and is a necessity for accurate zip+4 coding.

b. Merge/Purge all files together to create one master list from which to work.

c. Zip+4 Coding of each customer and non customer record.

d. Assign the latitude/longitude of each zip+4 to each customer address. NDS is going to purchase the 1990 enhanced TIGER files for Jacksonville which will increase the accuracy to 30-35% in terms of zip+4 match rates.

e. Assign each customer phone number to a Pizza Hut Unit trade area based on the latitude/longitude boundaries of each trade area.

I. Create all statistical reports and tapes for the Jacksonville Market and deliver to Pizza Hut.

The following lists the pricing associated with the roll-out of this Program on a nationwide basis, as provided by NDS. The costs can also be applied to the Jacksonville Market with the exception of the software to be written for the analysis and also the enhanced TIGER file for Jacksonville which NDS is purchasing. As mentioned in discussions, NDS will have a zip+4 lat/lon file based on enhanced TIGER files in-house by May 15th, and will be able to use this file for all other Markets that Pizza Hut requests.

Pricing – The following list prices include all the work described in Step 3 a, b, c, d, & e. Based on the enclosed pricing, Pizza Hut can calculate the price to roll-out any market in the U.S.

Consumer List w/ Telephone Numbers –	$24 per thousand (/m)
*Business List w/ Telephone Numbers –	$26 /m
Pizza Hut CSC customer file –	$13 /m
Market Software Set-up –	$1,500
Trade Areas –	$14 each

*Pricing is based on an annual license for the Business-Facts abstract file. This fee is being waived for the Jacksonville Market test.

The following will illustrate the costs calculated for the Jacksonville Market Test.

Consumer List:	244,000@ $24 /m=	$ 5,855*
Business List:	30,000@ $26 /m=	$ 780*
CSC File:	98,000@ $13 /m=	$ 1,287*
Market Set Up:		$ 1,500
		$ ~~8,422~~
		$ 9,422
17 Trade Areas @ $45 each		$ 765
Enhanced TIGER & Program Set-up		#$ 7,000*
Total Jacksonville Costs		$ ~~16,187~~
		$ 17,187*(**)

*Costs may vary slightly based on the number of records received from Pizza Hut as well as the consumer and business lists.

#In the event, NDS is chosen as the vendor for the national 1-number roll-out, Pizza Hut will receive a $3,500 credit on the next two Market database compilations by NDS on this fee.

Paul Kluempers is the contact person at Pizza Hut assigned to the Program, though this letter is being executed on behalf of the field operation corporation. These terms and conditions are contingent upon the

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(**) Fifty percent (50%) of the Total Project Price shall be due and payable within thirty (30) days of signing this agreement. The remaining balance shall be due and payable within thirty (30) days of the completion of the project.

execution of an Agreement between NDS and Pizza Hut by May 1, 1992.

Accepted and Agreed:

EQUIFAX NATIONAL DECISON SYSTEMS	PIZZA HUT OF AMERICA, INC.
By: /s/ Robert A. Giest	By: /s/ Paul Kluempers
Name: Robert A. Giest	Name: Paul Kluempers
Title: Regional Mgr.	Title: Asst. Mkt. Mgr.
Date: 27 April, 1992	Date: 22 APRIL 1992

COMMERCIAL INFORMATION SERVICES AGREEMENT

THIS AGREEMENT, made effective as of the 27th day of February, 2004 ("Effective Date"), by and between **TARGUS Information Corporation**, a Nevada corporation ("TARGUS*info*"), and Vail Systems, Inc. an Illinois corporation ("CLIENT").

WHEREAS TARGUS*info* offers to license services as defined in Exhibit A (the "Services"), subject to the term and conditions in this Agreement;

AND WHEREAS CLIENT desires to license services from TARGUS*info* (the "Licensed Services", defined as those Services in Exhibit A licensed by CLIENT), subject to the terms and conditions in this Agreement, for use in providing routing services for Allstate Motor Club ("AMC");

* * *

MUREX LICENSING CORPORATION

P.O. BOX 4010
MCLEAN, VIRGINIA 22103
PHONE: 703.610.4860
FAX: 703.610.4862

Michael M. Barry
Chief Patent Counsel
MikeBarry@MurexLicensing.com

VIA REGULAR U.S. MAIL AND FACSIMILE TO 310.558.6755

December 12, 2001

Patriot Communications LLC
Mr. Dennis Holt, Chairman & CEO
10441 W. Jefferson Boulevard
Suite 100
Culver City, CA 90232-3512

Dear Mr. Holt:

Murex Licensing Corporation (MLC) is a subsidiary of Murex Securities Ltd. (MSL). MLC has the rights to license and otherwise enforce a portfolio of patents, including patents owned by MSL. Please see the attached list of patents in the MLC portfolio. Many of the MLC patents are the result of inventions pertaining to geographic telephone call routing and related services by inventors at TARGUS Information Corporation, which is a licensee of the MLC portfolio.

We understand that Patriot Communications provides geographic telephone call routing services using 800 Adept, Inc. Some time ago 800 Adept challenged the validity of the Murex U.S. Patent No.

5,506,897 patent by instigating a reexamination proceeding in the U.S. Patent Office. The Patent Office recently rejected 800 Adept's challenge and confirmed the validity of all 84 claims of the Murex '897 patent.

We have reviewed marketing information from Patriot Communications that indicates your company uses technology covered by patents in the MLC portfolio. For example, your CableSeek® system and IVR Enhanced Routing Services must capture a caller's ANI and correlate it to spatial key information (e.g., zip+4 or lat/long) to index into a table or database to route a call and/or provide other services. The MLC portfolio includes claims that cover the commercially viable ways to implement these types of location-based services so that they can be "continuously updated" as described in your marketing literature.

MLS is willing to license Patriot Communications under the MLC patent portfolio on reasonable terms. Please contact us at your earliest convenience so we can arrange a meeting to begin to resolve this important matter. We look forward to hearing from you soon.

Sincerely,

/s/ Mike Barry
Michael M. Barry

Attachment (MLC Patent Portfolio list)

Cc: Doug Livingston

Gordon & Glickson

[Address and Phone Number Omitted in Printing]

August 25, 2003

Mr. Alexander R. Shimkus
Allstate Insurance Company
2775 Sanders Road
Suite A-8
Northbrook, IL 60062

Re: *Murex Securities, Ltd., et al. v. Vail Systems, Inc.*
Case No. 6:02-cv-1354-Orl-28-DAB

Dear Mr. Shimkus:

This will confirm our telephone conversation of August 21, 2003, regarding the patent infringement claims that have been brought by Murex against Vail. Since Vail is a licensee of the Targus Information Corporation database and since Targus is a company owned by Murex, Vail was quite surprised that Murex would be claiming that the call routing services provided by Vail to its customers infringed the Murex patents. In other words, the suit raised the question in the mind of Vail as to how it could be an infringer of the Murex patents when Vail is licensed to use the patents in performing call routing services.

In order to learn what precipitated the filing of this lawsuit against Vail, we met with counsel for Murex on August 19. At this meeting, we learned that the sole basis for Murex's filing of its complaint against Vail is the call routing services that Vail provides on behalf of Allstate Motor Club. Specifically, Murex is

complaining that Vail's use of the data provided by Allstate (which includes a database from 800 Adept, Inc.) to perform call routing services on behalf of the Allstate Motor Club infringes the Murex patents.

You may not be aware of this fact but Vail has no relationship with 800 Adept and does not use the 800 Adept database for any purpose when providing services to its customers other than in the case of Allstate. Since Allstate requires that the alleged infringing database be used by Vail on behalf of the Allstate account, and further since the data is supplied to Vail by Allstate, Paragraph 10.1 of the Agreement between Vail and Allstate dated March 14, 2003 (Allstate contract number VERL-10/03/02-3) Allstate is required to provide a defense of this matter to Vail. It is obvious that Vail is a named defendant solely as a result of Vail's use of the content provided by Allstate to Vail under the aforesaid contract for voice hosting services.

Enclosed please find a copy of the Complaint filed by Murex against Vail. We believe it is appropriate to meet with representatives of Allstate so that an agreement can be reached as to how this matter should be handled going forward. Since a responsive pleading to the Complaint must be filed on or before September 15, 2003, we request that a meeting be scheduled immediately in order to protect the rights of both Vail and Allstate.

We anticipate that this matter will be addressed immediately and we thank you in advance for same. We await your advice.

Very truly yours,

Gordon & Glickson LLC

/s/ Stuart Smith
Stuart Smith

SS/bah
Enclosure

cc: Mr. James Whiteley, Vail Systems, Inc.

800 [LOGO] ADEPT®
(Patent Pending)

Mr. Dennis Ainge
Director National Sales
Belleek Collectors International Society
9893 Georgetown Pike Suite 525
Great Falls, Virginia 22066

October 1, 1996

Subject: Information on 800 ADEPT, INC.
Maps, brochures, etc.

Dear Dennis:

I enclose a map of the New York area which contains the locations you gave me, plus all the Macy's outlets in the area. I believe you told me that Macy's is one of your distributors. These are shown in the map with a blue star. In addition I made up some potential distributor locations which I labeled with a red star.

The map is simply to give you an idea of what your distributors look like geographically. You can then apply whatever criteria you want in order to route the calls. Let me give you some examples of routing criteria used by other companies.

1. The nearest (as the crow flies), no exemptions.

2. Same as above but using a multitude of exemptions that we take into consideration, such as bodies of water, rivers, islands, etc.

3. Physical territories such as zip codes, highways, county lines, etc., shopping patterns (this requires input from your people).

4. Territories on the basis of dealer size. For example there are 4 kinds of dealers. Dealer category 1 has double the territory of dealers in category 4. Dealers in category 2 has one and half times the territory of Dealers in category 4. Dealers in category 3 have only a specific area assigned to them such as 2 or 3 mile radius. What this option says is that we can take into account other criteria such as dealer sales performance etc. when assigning sales territories.

5. Mixtures of all the above criteria combined.

We can produce maps at a street level basis nationwide. We can put into the maps whatever features you want to see. Some additional services that we offer are:

1. We can plot all your calls onto a map, (this is usually done on a by-location basis or an area basis). Depending on what you want to see, we can then add demographic information to the data. This service is more expensive, and it is performed on whatever frequency you choose.

2. We can match names and addresses to the phone numbers that have called Belleek. This data is sometimes used by direct marketers.

3. We can produce call reports using whatever frequency you want. Monthly is the standard, but we produce reports weekly and/or daily for some large Clients. The reports are custom made and include whatever information or breakdown of information you want to see. We produce a report called the dealer report which shows the number

of calls each dealer has received and whether the call rang busy or was not answered by the dealer.

4. If a call is busy or not answered within a specified number of seconds, say 30 seconds, the call can then be re routed to a secondary dealer, to a call center, or to an individual dealer mail box system. What I am saying is that the call can be re routed to as many dealers as you wish. For practical reasons, namely, the time the customer must wait on the line, it is not suggested that you go beyond two or three dealers.

5. The network can be set up on a time of day and day of week basis. For example, after each dealer's working hours, the calls to that dealer can be sent to another dealer and/or a call center. In other words, the system has unlimited routing capabilities.

I enclose some information I wrote recently on the differences of 10 digit routing versus 6 digit routing. In addition, I include a copy of a brochure which is now old, but it still has the gist of some of the things we do.

Among our list of large Clients are: Allstate Motor Club. I include a video which was produced by both Allstate and 800 ADEPT. A live presentation of this video was given by Allstate at a Convention in Nashville of National Direct Marketers Association. You may also check out Enterprise Rent-A-Car which uses the number 1-800 RENT-A-CAR. Theirs is a fine system which is updated weekly. We are in the process of setting up a similar system for them in Canada.

We also handle Ryder Truck Rental with the numbers 1-800 GO RYDER (consumer trucks), and 1-800 BY RYDER (commercial trucks). These are all major accounts with daily reports and major weekly updates and changes.

Let me know what you want to do or how you envision your application. Our applications have saved our customers a lot of money by eliminating or substantially reducing their Call Center costs and improved their sales by connecting the call directly and seamlessly to the dealer or person who can best handle it. I am sure you know, that the best opportunity for a successful sale is by letting the customer speak with the person who can best service their needs at the time the person was motivated to call.

Our costs are dependent on the size of the application and the specifics of a given Client. We have two basic costs: A one time set up and configuration charge; and a monthly service fee to maintain the integrity of the system, make additions, deletions, keep up with area code splits and changes in the phone numbers as a result of people moving, and exchanges being added or deleted throughout the country. Our basic rate for a 2500 location account are about $16.00/location one time and about $7.00/month/location. Our cost ultimately depends on what you want to do. Once I know better what you want to do, we could probably offer you some further discounts. Our per minute rates are $.17/min. or less depending on call volume. There are

no per call charges or any other fixed charges from the Long Distance Telephone Carrier.

Very Truly Yours,

/s/ Juan F. Sierra
Juan F. Sierra
President/CEO

MUREX LICENSING CORPORATION

P.O. BOX 4010
MCLEAN, VIRGINIA 22103
PHONE: 703.610.4860
FAX: 703.610.4862

MICHAEL M. BARRY
CHIEF PATENT COUNSEL
MikeBarry@MurexLicensing.com

VIA REGULAR U.S. MAIL AND FACSIMILE TO 314.512.4206

June 10, 2002

Enterprise Rent-A-Car
Mr. Andrew C. Taylor
Chairman & CEO
600 Corporate Park Drive
Saint Louis, Missouri 63105

Re: The Murex Patent Portfolio

Dear Mr. Taylor:

Murex Licensing Corporation (MLC) has the rights to license and otherwise enforce a portfolio of patents known as the Murex patent portfolio. For your convenience we enclose a list of the currently issued Murex patents. Many of the patents are the result of inventions pertaining to geographic telephone call routing and related services by inventors at TARGUS Information Corporation, which is a licensee of the Murex patent portfolio.

We understand that Enterprise Rent-A-Car uses geographic telephone call routing services provided

by 800 Adept, Inc. You may know that 800 Adept challenged the validity of one of the Murex patents (5,506,897) by instigating a reexamination proceeding in the U.S. Patent Office. Last year the Patent Office rejected 800 Adept's challenge outright and confirmed the validity of all 84 claims of the Murex '897 patent. The '897 patent is just one of many patents in the Murex portfolio, which now has well over five hundred claims directed to inventions such as geographic telephone call routing. The Murex portfolio also includes U.S. Patent No. 4,757,267, known as the "Riskin patent", which covers basic methods of routing telephone calls based on the first six digits of a telephone number.

Several years ago 800 Adept obtained a patent directed to a very specific type of single-table routing system. The system disclosed in 800 Adept's patent is commercially impracticable. The Murex portfolio, on the other hand, includes several patents directed to superior, fully-automated methods and systems (including single-table and multi-table methods of geographic routing, as well as real-time methods that do not rely on pre-built tables). The Patent Office has repeatedly declared Murex's inventions to be patentable over 800 Adept's patent.

It takes little imagination to understand why 800 Adept challenged the validity of the Murex '897 patent – 800 Adept requires (but does not have) a license under the Murex patents. Indeed, any commercially practicable geographic call routing system

must use claims from the Murex patents. Thus, Enterprise Rent-A-Car's call routing system requires a license under the Murex patent portfolio.

MLC recently enforced the Murex patents against four companies in the U.S. District Court for the Eastern District of Virginia. Two of the defendants (Qwest and Vicinity Corporation) were companies that made and sold infringing technologies, and the other two (Pizza Hut and Domino's) were customers that used the patented technologies from the first two defendants. We recently agreed to settle and dismiss the lawsuit after entering into three separate settlement agreements with the defendants. After extensive litigation, Judge Ellis (one of the most respected patent judges in the U.S.) issued an Order defining meanings of disputed claim terms from the Murex patents. Judge Ellis rejected the defendants' arguments and gave these claim terms the broad meanings proposed by MLC. This litigation significantly strengthened the Murex patents. For your convenience in reviewing the Murex patents, we enclose a copy of the Order.

Please be advised that MLC has no intention of suing Enterprise at this time for patent infringement. Rather, MLC is willing to license Enterprise Rent-A-Car under the Murex patent portfolio on reasonable terms. Please contact us at your earliest convenience so we can arrange a meeting to begin to

resolve this important issue. We look forward to hearing from you soon.

Sincerely,

/s/ Michael M. Barry
Michael M. Barry

Enclosures

Jim Shaffer, 02:06 PM 5/27/1999 -0400,
TARGUS patent 5,907,608 issued on May 25, 1999

From: "Jim Shaffer" <jimshaffer@TargusInfo.com>
To: "Dan E. Gallagher" <DanGallagher@TargusInfo.com>
"George G. Moore" <GeorgeMoore@TargusInfo.com>
Subject: TARGUS patent 5,907,608 issued on
May 25, 1999
Date: Thu, 27 May 1999 14:06:12 -0400

George and Dan

This is a set of claims related to building and using one table systems i.e. a telephone number to telephone number Table (TNTTN) like 800 Adept (Neville) uses. There are two very significant sets of claims in this patent related to pinning Neville and Neville clients into a corner from a practical use perspective.

One set relates to using any one table (TNTTN) system in a Telephone network for routing, when the caller provided phone number is provided by a non network capatured means (anything other than ANI or Caller ID). These other means for which we have coverage obviously include DTMF and voice recognition capture of a caller provide telephone number. Neville says his system is totally automatic and does not require the caller to provide anything.

The other set of claims relates to building a one table system by merging a master phone number to spatial key table with a client spatial key to dealer location phone number table using standard computer two file sort and merge techniques. This is by far the most

efficient way to build such a table. We also have a claim set in a pending patent that builds the TNTTN table via the second most eflicent way that is problably about 1,000 times more computer intensive than the now patented method. In the second method, we do a real-time computer point in polygon determination for each phone number on the master list. Neville has the general conceptual claim on determining in which client service area polygon a the caller is located and building a TNTTN table for use in a telephone call routing network, but only explains how to build the table visually with the aid of a GIS system or manually. In practice Neville has to be using method 1 or 2 above.

TARGUS does not use any of the above claimed methods in any of our products or services, so we do not infringe on any of Neville's claims.

Thanks
Jim

Dear David,

Todd tells me that Allstate wants to switch away from 800-ADEPT by the end of this month – i.e., 20 days from today. I think it's do-able, but there's a lot to do between now and then. We also need to finish the switching of tables from Sybase to SQL Server – the hold up is loading data into those tables, which is a problem I'd like to see solved ASAP.

Would it be possible to have a meeting tomorrow to work out a "battle plan" for this project? I'll need to see the following people there:

Andrew
DeGang
Vadim
Steve
Todd
yourself

I'm available any time.

With a bit of luck, we should be able to pull this off.

Regards . . .

Stuart Smith
09/25/2003 03:29 PM

To: Ashim@allstate.com
cc:
Subject: Discussion with Counsel for Murex

Dear Alex,

Confirming our telephone conversation of today, I had a discussion with both inside and outside counsel for Murex last week regarding the patent disputes between 800 Adept and the Murex companies. They were quick to point out that we (Allstate and Vail) are in this mess because 800 Adept chose to sue the Murex companies over their respective patents. According to the lawyers, the Murex companies now have to take whatever action is necessary to protect their intellectual property and disprove the claims of 800 Adept. They believe they need to now bring in all those companies, like Allstate and Vail, who they understand are also infringing the Murex patents.

I told them no matter now many additional companies they might bring into this litigation, the dispute is still between 800 Adept and Murex and that Vail and Allstate would add nothing to the litigation. I asked what it would take to get us out of the lawsuit. Murex counsel responded that if we took a license from Murex to handle the Allstate routing services, Murex would dismiss its case against Vail. The license fees would be 4 cents per call. I did not attempt to negotiate this figure in any way but merely told them I would discuss it with you. I asked Jim Whiteley what this proposal would cost us if accepted. He told me the telephony center handles about

1 million calls per year for Allstate so this would amount to a $40,000 annual license fee. It appears that it would be cheaper to take a license than try to defend a patent infringement lawsuit. There is also a good probability that the lawsuit will be decided relatively quickly so that a license for 1 year or less may be sufficient at this time. Let me know what you think.

Stuart

Stuart Smith
Gordon & Glickson LLC
Legal Services to the Information Technology Markets
312.321.7653 Phone – 312.321.9324 Fax
ssmith@ggtech.com – http://www.ggtech.com

Ross Shanken

From: George G. Moore <georgemoore@targusinfo.com>
To: Ross Shanken (TARGUS) <rossshanken@targusinfo.com>
Sent: Thursday, June 01, 2000 4:13 PM
Attach: George G. Moore (E-mail).vcf; Response to Adept Attorney Letter.doc
Subject: 800-Adept Response

Ross:

We (exhaustively) reviewed the claims that 800 Adept made in their letter of May 11, 2000, to TARGUS and our partners and customers, Budget/Ryder, West, and AT&T.

I have attached our response to Adept that was FedEXed today to them.

Their is no merit in the Adept claims. Their letter can only be motivated to confuse our clients and partners and to cast their decision to use our services in a negative light.

TARGUS dominates the intelligent call routing industry today and we are at least 30 times the size of Adept. The routing processes that we deploy for Budget/Ryder are the same as we have deployed for dozens of companies in the past 5 years. Adept has never informed us on any potential patent infringement for our other clients. The only motivation for the current communication must be the loss of the Budget/Ryder business which would represent a significant piece of Adept revenues.

Please assure our partners and customers that we believe that the Adept claims are without merit, that they have not accused TARGUS of infringement, that there is little risk to their ability to avail of our routing services, and that TARGUS will vigorously defend and protect the intellectual property rights that enable us and our clients to have the best routing solutions.

If necessary, I would be glad to participate with our customers in conference calls to further clarify any of the above.

George

George G. Moore
CEO
TARGUS INFORMATION CORPORATION
"The Real Time Intelligence Company"
www.targusinfo.com
email: georgemore@targusinfo.com
703-847-6200 (o)
703-847-6201 (f)
703-608-1300 (mobile)
email to mobile: 7036081300@mobile.att.net

From: George G. Moore
[georgemoore@targusinfo.com]

Sent: Wednesday, May 26, 1999 8:36 AM

To: Jim Shaffer

Subject: RE: CPI with all Distance claims reviewed by PTO

Jim:

I agree and we should go for as close to 100% approval of claims as feasible. Our patents will become a keystone for the company and we can already see that, with the broader definition of telecommunications, that there are large potential infringers beyond the tradition telcos such as TCI, Microsoft, 3COM, etc. Also, I believe that we will get into a pitched battle with ADEPT and we need to have as much ammo as is possible.

While we have made no money to date, as we develop the market, infringers will emerge. It is probably too early to develop a patent enforcement strategy and expend significant sums on it.

I am meeting with Mark Thielken today and he is updating me on ACXIOM's view of our patents.

The CTI show is going very well and we will all be done there today.

Also, I spoke to Ross about ENCORE. The annual volume is 750,000 calls. The application is either terminate the call at the cable operate or, if closed, capture the lead by IVR and forward it to the cable

operator. Because of the spiked volume, the cable operators cannot handle multiple callers for capture via voicemail, etc.

Since we do not have the full functionality within the SCP currently, I suggest that we do it all at WEST who are currently doing all of the ENCORE business today but using a customer entered Zip 5 for routing. ENCORE want to use us because they do not want caller entered digits that give multiple answers.

I will talk to you later.

George

- - - - - Original Message - - - - -

From: Jim Shaffer [mailto:jimshaffer@TargusInfo.com]

Sent: Tuesday, May 25, 1999 7:02 PM

To: George G. Moore

Subject: CPI with all Distance claims reviewed by PTO

George

We got the first pass back from the PTO regarding our application with 46 distance claims. They accepted claims 1-9 and 15-24, but rejected claims 10-14 and 25-46 as being anticipated by Risken. The rejected claims are all very broad claims and all except one do directly overlap Risken. I would think we could get them all allowed by tightening our wording to show a precision difference over Risken. Even if we do not get all these approved, it should be almost

impossible to get around either our claims, Risken claims or both in any telephone routing application that relates to distance.

My thinking is we give this one more last push with our response to the PTO and take what we can get. We've already got 90% of what we want in this area and getting the last 10% could take an effort greater than its expected value.

Neville was reference by the PTO as being reviewed and as being related, but our claims as written do not overlap with Neville and were not anticipated by Neville. This is very good if we ever go after them for a distance infringement.

Speaking of Risken, there are a couple of Vail applications and a couple of Next link applications that could be violating Risken. I'll have Gina have Dennis and Ross get more information on these applications and if they involve distance, we should calculate and pay Risken back royalties. The amounts would be minimal but at least they would be getting something as we want to keep them as a ally in the patent wars.

Thanks
Jim

From: Mike Barry
[mikebarry@murexlicensing.com]

Sent: Monday, December 10, 2001 9:00 PM

To: dlivingston@patriotllc.com

Subject: Moore/Shaffer patent declared valid over 800 Adept patent

Doug:

Thanks again for taking the time to talk with me this evening. As you know, 800 Adept challenged the original Moore/Shaffer patent as invalid over 800 Adept's patent in a proceeding at the U.S. Patent Office. Enclosed is a copy of the Notice of Allowance from the U.S. Patent Office that shows the Patent Office declared all 84 claims of the original Moore/Shaffer patent valid over the 800 Adept patent.

Patriot and its customers should be skeptical about 800 Adept's claims regarding its patents and the Murex patents. The 800 Adept Web site erroneously states that the original Moore/Shaffer patent (U.S. Patent No. 5,506,897) issued to 800 Adept. The 800 Adept Web site also grossly mischaracterizes of the scope of the claims of the 800 Adept patents by stating that 800 Adept is the only company that has the legal right to route calls using longitude and latitude. A review of the claims of 800 Adept's patent Re 36,111 shows that the claims are quite narrowly limited to a specific routing system. By contrast, the Murex patent portfolio includes ten issued patents with over 500 claims that broadly and thoroughly

cover the commercially efficient methods of call routing. Indeed, we are investigating 800 Adept's infringement of claims in the Murex patent portfolio.

We believe it will be quite helpful to discuss with your potential customers the advantages of using the technology covered by the Murex patents, as well as the dangers of using unlicensed services that infringe on the Murex patents. Please feel free to put me in contact with any customers that you believe can benefit from using the technology covered by the Murex patents, either by taking a license from Murex or else purchasing services from a Murex licensee such as TARGUS Information Corporation.

Sincerely,
Mike Barry
Michael M. Barry
Murex Licensing Corporation
tel) 703.610.4860
fax) 703.610.4862

From: Jim Shaffer
Sent: Monday, June 03, 2002 5:47 PM
To: 'Dennis.Beeson@HSC.com'
Subject: RE: Press Release from Vicinity on Murex Lawsuit.

Denny

Murex is an Isle of Man Company (Island between Ireland and England) owned by a Republic of Ireland Company with the same name that owns all 12 patents that George and I have issued. We assigned them to Murex so the company that inforces them is different that TARGUSinfo which has a license to all of them. This way TARGUSinfo does not have to sue potential customers.

Thanks
Jim

- - - - - Original Message - - - - -
From: Dennis.Beeson@HSC.com
[mailto: Dennis.Beeson@HSC.com]
Sent: Monday, June 03, 2002 2:14 PM
To: Jim Shaffer
Subject: Re: Press Release from Vicinity on Murex Lawsuit.

Thanks Jim. Is Murex the company that was handling your patent infringement claim?

* * *

From: Darrell Gehrt

Sent: Friday, August 23, 2002 6:28 PM

To: Ken Berry (E-mail); Michael Rycheck (E-mail)

Cc: Ross Shanken

Subject: Allstate Motor Club – strategy

Ken/Mike,

Thanks for getting together with us this afternoon to strategize on how we can team up to win the AMC account. A couple of quick follow up points:

- ☐ We confirmed that we are under NDA (signed by Joe Palacious on your side). We can fax you a copy if you'd like
- ☐ Murex Victories – Below are several links to news services regarding the Murex patent victories
- ☐ Contact information – for both Ross and Darrell are at the bottom of this e-mail
- ☐ Call Flows – We'd love to look at the call flows we spoke about earlier. You can fax or e-mail them to us at the below contact information

CNET News.com:
<http://investor.cnet.com/investor/news/newsitem/0-9900-1028-20021566-0.html?tag=ats>

Excite:
<http://money.excite.com/jsp/nw/nwdt_ge.jsp?cat=PRRELEASE&src=105&feed=cmt&section=news&news_id=cmt-161p8057&date=20020610&alias=/alias/money/cm/nw>

Yahoo:
<http://biz.yahoo.com/prnews/020610/dcm007_1.html>

Lycos:
<http://finance.lycos.com/home/news/story.asp?symbols=PRNEWS:100&story=27460234>

At this point it seems to make sense to have Hanover approach Dave Bergland with the message that you have heard that Murex is aggressively defending their patents, and has had great success including victories against large, high profile companies. In addition, word on the street is that Allstate could be a potential infringer, and hence a target of Murex. Does it make sense to proactively look at a way to avoid legal problems if Murex turns up the heat. Hanover is partnered with TARGUS*info*, who has licenses to the Murex patents so AMC would be protected. . .

This new approach should open some ears. Lets see where this leads us.

Let me know if I can be of any help.

Regards,
Darrell

Darrell W. Gehrt
National Account Executive
Call Routing and Store Locator Solutions
TARGUS*info*

From: Darrell Gehrt
Sent: Wednesday, December 12, 2001 8:41 AM
To: Ross A. Shanken (E-mail)
Subject: Gehrt Short Term PipeLine Report 12.11.01.doc

* * *

Account that will be closed by March 31, 2001:

Enterprise Rent a Car

Written Status of Account:

Existing contract doesn't come up for this account until Feb 2002. ERAC is expressing some concern about a fast change but Ross and I are working with George and Mike on a strategy to get this done in February. If we don't get the full application in February, we will start a slow migration over the year to where we will have some business in 2002, and by February of 2003 we should have this account. Patriot/ERAC want to replace 800 Adept.

Services to be provided/Account Value:

Location Express/$12,000/month. Could be less with a migration.

What I need from TARGUS*info* in order to close this deal: Support from George/Mike to apply patent pressure/fear to move this account along. Mostly need to get directly in front of ERAC which has proven to be difficult.

* * *

MUREX LICENSING CORPORATION
P.O. BOX 4010
MCLEAN, VIRGINIA 22103
PHONE: 703.610.4860
FAX: 703.610.4862

MICHAEL M. BARRY
CHIEF PATENT COUNSEL
MikeBarry@MurexLicensing.com

VIA CERTIFIED MAIL AND FACSIMILE TO 314.552-7272

September 16, 2002

Thompson Coburn LLP
Richard E. Haferkamp, Esq.
One US Bank Plaza
Saint Louis, Missouri 63101

Re: Enterprise Rent-A-Car

Dear Mr. Haferkamp:

We have received no response to our many attempts to contact you since last June. It is important that we make some progress soon in settling this matter. Is your firm still handling this matter for Enterprise Rent-A-Car?

Murex recently signed license agreements with BellSouth and SBC (including Pacific Bell, Southwestern Bell and Ameritech) under the Murex patents. As you know, Qwest and Verizon already were Murex licensees. Thus, all Regional Bell Operating Companies now have taken licenses under the Murex patents. In view of this, Murex's current lawsuit

against Pizza Hut for these services soon will be dismissed. Murex can now focus on other unlicensed uses of the Murex patents, including Enterprise Rent-A-Car.

You asked in your June 19, 2002 letter for information regarding Murex's analysis of how Enterprise's operations fall within the scope of the Murex patents. As discussed quite some time ago, if you will agree to keep them confidential, then we will send you some claim charts that provide details on how Enterprise's use of the 800 Adept telephone call routing services infringes some exemplary claims from the Murex patent portfolio.

In your letter you requested a copy of the license between Murex and its licensee TARGUS*info*. While confidentiality prevents us from providing you a copy of the agreement, we can confirm that TARGUS*info* has a license under the entire Murex portfolio for all of its services. Accordingly, purchasing services from TARGUS*info* would obviate the need for a separate license from Murex.

Please contact me immediately to confirm your receipt of this letter. We look forward to hearing from you soon and hopefully working with you in a cooperative fashion to resolve this important matter.

Sincerely,

/s/ Michael M. Barry
Michael M. Barry

Enclosure

Cc: Mr. Andrew Taylor, CEO, Enterprise Rent-A-Car (by mail & fax to 314.512.4206)
Cc: Mr. Craig Kennedy, CIO, Enterprise Rent-A-Car (by mail & fax to 314.512.4530)

From: Mike Barry [mikebarry@murexlicensing.com]
Sent: Thursday, November 07, 2002 2:26 PM
To: Ross Shanken; Darrell Gehrt
Cc: Jim Shaffer; George Moore
Subject: Fw: proposals on the table

Darrell & Ross – here's what I sent per the teleconference today. MMB

----- Original Message -----
From: *Mike Barry*
To: *Bruce Bottomley*
Cc: *Victor Lazzaretti*; *Rena Sohn*
Sent: Thursday, November 07, 2002 2:24 PM
Subject: proposals on the table

Bruce – below are the options for resolving Murex's patent issues vis-a-vis McLeodUSA. These are open at least until we serve the complaint, which we will not do before next Friday. Let me know if you have questions, and I look forward to your response.
Thanks, Mike Barry

1) McLeodUSA takes a "straight license" (fifteen percent royalty, two cents per call minimum) under the Murex patents and pays $250,000 for a release for past usage (which will release Patriot and McLeodUSA's customers for use of McLeodUSA services).

2) MeLeodUSA signs a three-year agreement with TARGUS with annual minimums as currently proposed for the one-year agreement, in which case Murex will waive its claims to past usage.

3) McLeodUSA signs a one-year agreement with TARGUS Information with an annual minimum as currently proposed and pays Murex $250,000 for the release.

4) Average of previous two options – McLeodUSA signs a two-year agreement with TARGUS with annual minimums as currently proposed and pays Murex $125,000 for the release.

5) McLeodUSA signs a one-year agreement with TARGUS with annual minimums as currently proposed and the agreement includes options to renew for second and third years at the same annual minimums. There will be a separate agreement with Murex for McLeodUSA to pay Murex $275,000 if McLeodUSA does not renew after the first year or $150,000 if McLeodUSA does not renew after the second year. This separate agreement will require language to protect Murex against the statute of limitations on damages pending the second renewal or else payment from McLeodUSA. Also, note that I added a "delta" to the release payment as compared with options three and four because of the delay (cost of money plus increased risk to Murex).

6) As discussed, there are both objective (money) and subjective bases for Murex's willingness to resolve the past usage issues per above. As you can deduce or infer, Murex places a premium on the value to Murex of a deal with TARGUS that includes a three-year term with guaranteed minimums. Murex nevertheless will consider a variation of option five

that "buys down" a deferred release payment in the first three years of an agreement with TARGUS based on actual revenue to TARGUS over the same period assuming there are suitable protections for Murex's interests.

Michael M. Barry
Murex Licensing Corporation
tel) 703.610.4860
fax) 703.610.4862

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No. 2007-1272, -1356

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

800 ADEPT, INC.,

Plaintiff-Appellee,

v.

MUREX SECURITIES, LTD., MUREX LICENSING CORPORATION, TARGUS INFORMATION CORPORATION, AND WEST CORPORATION,

Defendants-Appellants.

Appeals from the United States District Court for the Middle District of Florida, No. 6:02-CV-1354, Chief Judge Patricia C. Fawsett

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OPENING BRIEF FOR DEFENDANTS-APPELLANTS MUREX SECURITIES, LTD., MUREX LICENSING CORPORATION, TARGUS INFORMATION CORPORATION, AND WEST CORPORATION

---

* * *

Following the re-examination, Targus asserted the '897 patent and related Moore-Shaffer patents against several parties (including some customers of 800 Adept) in two lawsuits in the Eastern District of Virginia. A5961-5962; A7190-7197; A7333-7334. The first case settled after Targus received a favorable

Markman ruling, with several defendants, including Vicinity Corporation (now Microsoft Corporation), taking a license to the Moore-Shaffer patents. A5687-5688; A7198-7199. The second case also settled and the defendants McLeod, Patriot, and Enterprise Rent-A-Car became Targus customers. A7348-7354.

Targus has also licensed the Moore-Shaffer patents to several companies, including Bell Atlantic Network Services, Inc., which is now Verizon Communications, SBC, BellSouth, Cincinnati Bell, InfoNow, and Acxiom Corporation. A5680-5686; A7200-7203; A13090; A13028; A13041. Acxiom Corporation, for example, agreed to pay Targus an annual fee of $1.7 million to license certain Moore-Shaffer patents. A5686; A13041.

SUMMARY OF ARGUMENT

I. The district court erred in failing to enter judgment as a matter of law that the accused Targus services – IntelliRouting Express and Location Express – do not infringe any asserted claim of the Neville patents. During trial, the district court incorrectly modified its claim construction of the "assigning" limitation in the Neville patents, which requires that service location telephone numbers be assigned to "all potential" callers before calls are actually placed. The district court incorrectly instructed the jury that "assigning" as used in the Neville patents does "not exclude calculations made during the telephone call." The district court further erred in refusing to enter

judgment as a matter of law that the accused Targus services do not infringe the Neville patents because they never assign service location numbers to "all potential" callers before a call is made, but instead assign service location numbers to actual callers by performing "real time" spatial calculations during the call.

II. The district court erred in refusing to hold that "direct routing" is a limitation in all the asserted claims of the Neville patents, including the claims directed to the construction of databases where that term appears in the preamble. The district court further erred in refusing to enter judgment as a matter of law that the accused Targus services do not infringe the Neville patents because they are not used to "directly route" calls, but instead require telephone platforms to make a second (and separate) call which is then bridged or connected to the first.

III. The district court erred in failing to enter judgment as a matter of law that 800 Adept's tortious interference claims are preempted by federal patent law because 800 Adept did not present evidence sufficient to support a finding that Targus' efforts to enforce the Moore-Shaffer patents against 800 Adept customers were "objectively baseless."

* * *

No. 2007-1272, -1356

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

800 ADEPT, INC.,

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v.

MUREX SECURITIES, LTD., MUREX LICENSING CORPORATION, TARGUS INFORMATION CORPORATION, and WEST CORPORATION,

Defendants-Appellants.

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ANSWER BRIEF FOR PLAINTIFF-APPELLEE 800 ADEPT, INC.

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* * *

C. Targus Does Assign All Potential Callers To The Correct Dealer

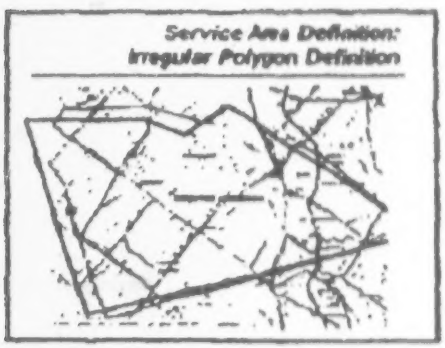
Targus' arguments on actual and potential callers and on the number and type of online calculations are designed to draw attention away from the real question: does Targus designate a "correct" dealer (one designated in accordance with the client's criteria) for all potential callers before the call? It does.

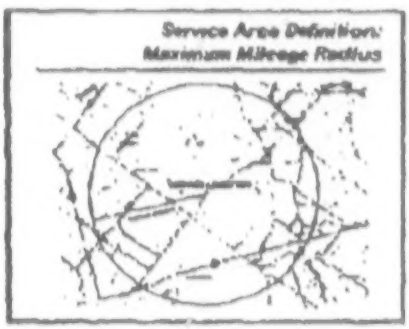
Moore himself testified that Targus routes for "all potential callers" (A5314) and that Targus either has the potential caller number in its Master Table or a default, whereby the NPA/NXX of unknown numbers are assigned the coordinates of a nearby switch, which in turn is assigned to the dealer whose area encompasses that switch. (A5318-5320). Targus routes for all potential callers; that is the only way its system is commercially viable. (A14946-47; A4870-4941; A4962-5127; A7766-7772).

The alleged distinction between "real time" systems that only determine locations for the caller during a call and allegedly non-real time systems like Neville's is similarly flawed and makes no sense in the commercial context in which Targus constructs call routing applications. With Targus' franchise customers, for example, "each franchisee has a legally-defined franchise boundary" and the franchisor "guarantees it [the franchisee] will get all calls from that [franchisee's] area." (A6264). To follow through on this guarantee, Targus provides an interface through which customers assign all potential callers to franchise or other dealers before the call. (A13399-13400). For franchise territories and other polygon territories, the client, according to Targus' own User's Manual (A13375-13407), "points and clicks" the polygon's precise boundaries, such that "you will define Callers from within that area [who] will *automatically be assigned* to that service location 'on the fly' on each telephone call." (A13400). Targus' manual adds that changing "service area polygons

will automatically change the routing." (A13400). The process is the same for radius territories where the "service area definition becomes a circle around each location, with the radius of that circle being defined by the user" such that callers "from within that circle will *automatically be assigned* to that service location 'on the fly' with each telephone call" (A13399).

The resulting assignments of callers to dealers are illustrated in Targus' User Guide: (A13399-13400). In this "off-line" process performed before any caller places a call, the customer defines the "service area" for each dealer, requiring that all callers within the service area be assigned to the dealer who "owns" that radius or polygon territory. Targus then implements direct routing instructions that will connect the caller to the "correct service location." (A13386).





(A13399-13400).

It makes no difference whether the instructions executed by Targus are a series of lookup calculations, a point-in-polygon algorithm to "calculate" whether the caller is located within a particular polygon service area, or "calculations such as

the shortest distance between coordinate points" (A16662, abstract), the calculations will always route the call to the correct dealer every time the call comes in at the client's designated routing times; it is entirely deterministic. Otherwise the call is "misrouted" (A5603), and a call can only be misrouted to the wrong dealer if there was a *right* dealer designated before the call. All callers, whether actual or potential, are therefore assigned to dealers, and must be for Targus to meet its customers' requirements.

Targus implies that its calculations are performed during the call, when, in reality, nearly everything in "IntelliRouting" is prebuilt and precomputed. For every potential caller, Targus has a prebuilt "Master Table" containing precoded phone numbers and their matching zip+4 coordinates or a default six digit number and its premapped zip+4. This "Master Table" is linked to a "GDT file" containing all zip+4s and their corresponding lat/lon centroids. Through these tables (Master and GDT) Targus has coded each potential caller number with the appropriate (or a default) lat/lon coordinate. (E.g., '111 claim 29, "allocating") (A5022-5023; A5031-5032).

Targus also precomputes a "window key" by taking the lat/lon for potential caller numbers and truncating their respective coordinates into seven digit values, from which it creates a precomputed grid around the potential caller's location. This permits Targus to have a relation that takes the caller's ANI and yields a "window" or grid around the caller. That window may be activated when the caller's ANI

arrives at the platform, like West or Vail, but it is precomputed – coded to make that grid around the potential caller's location before the call ever arrives (A5024-5025).

Targus also predefines service location areas as illustrated in the description from the "User Guide," above. This enables the client to "define *callers* from *within that area* [who] *will automatically be assigned* to that service location" (A13400), thus permitting Targus to "instantly and precisely match the caller's 10 digit telephone number to the correct service location." (A13386). How does this "automatic" assignment occur? The store locations (along with location information) are pre-coded into a client location file, which is in turn indexed by the precomputed "window" key. (A5024-5025). This location file contains the boundaries of one or more geographic areas of any size or shape, according to the client's polygon or radius service area definition – areas defined (using the Targus tools) by lat/lon. (E.g., claim 29, "defining"). (A5025-5027; A5032; A13375-13407).

/ Having defined the caller locations and the dealer locations for those callers in advance and linked them together using the window key and prestored algorithms, Targus has now assigned (before the call) to the location of potential callers a telephone number of a service location that "will receive calls originating from within the boundary" of potential callers. ('111 claim 29, "assigning") (A5023-5029; A5032).

Targus' computers enable the routing of the call to the assigned destination "instantly and precisely" (A13386) only because Targus has designated the dealer that will receive the call in advance, in the database and its associated algorithms. What actually occurs on-line is simply the execution of the predesignated assignments already made in the database.

Consider the various linkages by which this assignment has been made: the caller number is linked to the zip+4 of the caller (location), which is linked to the lat/lon of the centroid of that zip+4; that lat/lon value is in turn linked (via window key) to the record in the client location table that contains the phone number of the designated service provider, which will be retrieved by a designated radius calculation (for the one closest provider) or a designated point-in-polygon calculation (for dealer franchises or single territories) that can find only one dealer. (A5019-5037). If we simply trace the linkages backward, is it not clear that the telephone number of the dealer has been assigned (in advance) to the zip+4 centroid (physical location) of the potential caller?

The designated algorithm employed for Targus' "calculation," moreover, is entirely mechanical: it will return the same dealer every time the "calculation" is made for the same caller location in the same time frame. The correct dealer meeting the client's criteria for any given potential caller location is thus assigned (designated) in the database before the caller's call is placed, just as in Neville. Targus' use of algorithms

differs not at all from Neville's use of "calculations such as . . . shortest distance between coordinate points" (A16662, abstract) to satisfy a particular client's criteria via stored procedures in the database. (A4596). Hence the distinction between Targus' routing and Neville's is nonexistent.

Targus' other routing product, Location Express, works in much the same way, only Targus' platform partner will use its own programming to route the call, following a path like that of Intellirouting Express, as Targus has itself illustrated. (A30061-65; A5029-5030).

It makes no sense for Targus to argue that it only assigns actual callers and does not know where potential callers will be routed when it has already implemented routing instructions for routing all callers to the "correct" dealers every time, in accordance with the client's prestored criteria.

II. DIRECT ROUTING IS NOT A LIMITATION IN ALL CLAIMS

Neville's database construction claims ('111, Claim 41, '689, Claim 1) state that the database resulting from the method can be "used . . . for direct routing." (A8414; A8416-8432). Targus takes this intended statement of use from the preamble and seeks to incorporate it as a limitation into both claims 41 and 1. But "[i]f the preamble adds no limitations to those in the body of the claim, the preamble is not itself a claim limitation and is irrelevant to proper

construction of the claim." *IMS Tech., Inc. v. Haas Automation, Inc.*, 206 F.3d 1422, 1434, 54 U.S.P.Q.2d 1129 (Fed. Cir. 2000). How can Targus escape this principle? It is clearly seeking to import into the body of the claim an additional element (direct routing) that is not only *unnecessary* for the construction of the database but can take place only *after* the steps in the body of the claim have been completed and the database has been assembled.

"Direct routing" was defined by the Court as routing a call "without a human or computer re-dialing or otherwise placing a second call" (A1275).

* * *

IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF VIRGINIA
Alexandria Division

MUREX SECURITIES LIMITED and MUREX LICENSING CORPORATION, Plaintiffs, v. ENTERPRISE RENT-A-CAR COMPANY, PATRIOT COMMUNICATIONS LLC, and MCLEODUSA TELE-COMMUNICATIONS, INC., Defendants.	Civil Action No. 2:02cv865 **(Related to dismissed Civil Action Nos. 01-1895-A and 02-498-A, assigned to Judge T.S. Ellis, III)** **JURY TRIAL DEMANDED**

COMPLAINT FOR PATENT INFRINGEMENT

(Filed Dec. 17, 2002)

Plaintiffs Murex Securities Limited and Murex Licensing Corporation, by their attorneys, complain against defendants Enterprise Rent-A-Car Company ("Enterprise"), McLeodUSA Incorporated ("McLeod") and Patriot Communications LLC ("Patriot") as follows:

THE PARTIES

1. Plaintiff Murex Securities is a limited company incorporated in the Isle of Man, with its principal place of business at 8 Myrtle Street, Douglas,

Isle of Man. Murex Securities is the owner of the patents-in-suit.

2. Plaintiff Murex Licensing is a Delaware corporation, with its principal place of business at 8010 Towers Crescent Drive, Fifth Floor, Vienna, Virginia 22182, within the judicial district of the Eastern District of Virginia. Murex Licensing is the exclusive licensee of the patents-in-suit and is authorized by Murex Securities to sublicense and enforce the patents-in-suit.

3. Upon information and belief, defendant Enterprise Rent-a-Car Company is a Missouri Corporation, with its principal place of business at 600 Corporate Park Drive, St. Louis, Missouri 63105. According to its Website, Enterprise is the largest rental car company in North America, and has 5,000 rental locations in five countries.

4. Upon information and belief, defendant Patriot Communications LLC is a Delaware Corporation, with its principal place of business at 10441 W. Jefferson Blvd. Suite 100, Culver City, California 90232. According to its Website, Patriot is a leading provider of interactive telecommunications services, operates a state-of-the-art communications network, and has a national presence. Among Patriot's services are interactive voice applications, dealer locator applications, telemarketing and direct marketing services.

5. Upon information and belief, defendant McLeodUSA Incorporated is an Iowa Corporation,

with its principal place of business at McLeodUSA Technology Park, 6400 C Street SW, Cedar Rapids, Iowa 52406. Upon information and belief, McLeod provides integrated communications services, including nationwide directory assistance services and enhanced nationwide 800 number services.

JURISDICTION AND VENUE

6. This is an action for patent infringement arising under the patent laws of the United States, 35 U.S.C. §§ 271, *et seq.* This Court has exclusive jurisdiction over the subject matter of this action under 28 U.S.C. §§ 1331 and 1338(a) for infringement of the following U.S. Patents (collectively referred to herein as "the patents-in-suit"):

- U.S. Patent No. 4,757,267 ("the '267 Patent") entitled "Telephone System for Connecting a Customer to a Supplier of Goods," duly and legally issued on July 12, 1988.
- U.S. Patent No. 5,506,897 ("the '897 Patent") entitled "Automatic Routing System for Telephonic Services," duly and legally issued on April 9, 1996. The '897 Patent has been reexamined by the U.S. Patent and Trademark Office, and a Notice of Intent to Issue a Reexamination Certificate was issued by the U.S. Patent Office on October 10, 2001. There were no changes to the specification or drawings during the reexamination, and

the U.S. Patent Office confirmed all eighty-four originally-issued claims.

- U.S. Patent No. 5,848,131 ("the '131 Patent") entitled "Automatic Information and Routing System for Telephonic Services," duly and legally issued on December 8, 1998.
- U.S. Patent No. 5,901,214 ("the '214 Patent") entitled "One Number Intelligent Call Processing System," duly and legally issued on May 4, 1999.
- U.S. Patent No. 5,907,608 ("the '608 Patent") entitled "Automatic Routing and Information System for Telephonic Services," duly and legally issued on May 25, 1999.
- U.S. Patent No. 5,910,982 ("the '982 Patent") entitled "Automatic Routing and Information System for Telephonic Services," duly and legally issued on June 8, 1999.
- U.S. Patent No, 5,956,397 ("the '397 Patent") entitled "Automatic Routing and Information System for Telephonic Services," duly and legally issued on September 21, 1999.
- U.S. Patent No. 5,982,868 ("the '868 Patent") entitled "Automatic Routing and Information System for Telephonic Services," duly and legally issued on November 9, 1999.

- U.S. Patent No. 6,058,179 ("the '179 Patent") entitled "One Number, Intelligent Call Processing System," duly and legally issued on May 2, 2000.
- U.S. Patent No. 6,091,810 ("the '810 Patent") entitled "Automatic Routing and Information System for Telephonic Services," duly and legally issued on July 18, 2000.

7. This Court has personal jurisdiction over the defendants because they conduct, transact and/or solicit business within this judicial district. In addition, this Court has personal jurisdiction over the defendants because they have committed and continue to commit acts of infringement of one or more claims of one or more of the patents-in-suit within this judicial district.

8. Venue is proper in this district pursuant to 28 U.S.C. §§ 1391(b) and (c) and 28 U.S.C. § 1400(b), as each of the defendants is subject to personal jurisdiction and therefore resides in this judicial district.

BACKGROUND

9. On February 22, 1993, James D. Shaffer and Dr. George G. Moore filed their first patent application in the United States Patent and Trademark Office covering a break-through technology that allows customers to search for and locate business locations nearest to them, and that routes the

customer's telephone call to that rental or service location. That patent application ultimately issued on April 9, 1996 as U.S. Pat. No. 5,506,897 ("the '897 Patent").

10. Mr. Shaffer and Dr. Moore continued to develop and expand their technology to include telephone routing and information retrieval across multiple platforms such as the World Wide Web, wireless devices such as cellular telephones and personal data assistants, and land-line telephones. Mr. Shaffer and Dr. Moore filed additional patent applications to cover these technologies that ultimately issued as patents, including the other patents-in-suit.

11. Based on assignments by Mr. Shaffer and Dr. Moore, each of the patents-in-suit is owned by Plaintiff Murex Securities, a venture capital and investment company formed in 1992 as a Bahamian corporation by U.S. and Irish investors to fund start-up companies in the U.S., Great Britain and Ireland. Murex Securities later re-incorporated in the Isle of Man.

12. In 1992, Murex Securities funded TARGUS Information Corporation ("TARGUSinfo") to commercialize the technology invented by Mr. Shaffer and Dr. Moore. Since its founding, TARGUSinfo, which is headquartered in Vienna, Virginia, has become recognized as a pioneer in the development of real-time intelligence to help companies more productively process customer and prospect transactions. Moreover,

its importance in the Northern Virginia business community was recently recognized by Deloitte & Touche LLP when, based on TARGUSinfo's 758 percent increase in revenues from 1996-2000, Deloitte named TARGUSinfo as one of the fifty fastest growing technology companies in Virginia.

13. In 2000, Murex Securities formed Plaintiff Murex Licensing to promote the licensing of the Murex patent portfolio in the United States. At that time, Murex Securities appointed Murex Licensing to be the exclusive licensee of the Murex patents.

14. Murex Licensing also seeks out patents and other intellectual property that will complement its patent portfolio. In 2001 Murex Licensing purchased and became the assignee of the '267 patent.

15. Defendant McLeod manufactures, operates, sells, and/or offers to sell a wide range of products and services, which provide methods and apparatuses that, *inter alia,* permit individuals to search for and locate business locations nearest them via telephones. McLeod's methods and apparatuses are intended and are available for use by consumers and businesses located throughout the United States, including within the Eastern District of Virginia. Consumers and businesses located within this judicial district do, in fact, use McLeod's methods and apparatuses.

16. McLeod has been notified of the patents-in-suit and relevance of the patents to McLeod's ongoing business operations, but to date McLeod has refused to take a license under reasonable terms.

17. Defendant Patriot manufactures, operates, sells, and/or offers to sell a wide range of products and services, which provide methods and apparatuses that, *inter alia*, permit individuals to search for and locate business locations nearest them via telephones. Patriot's methods and apparatuses are intended and are available for use by consumers and businesses located throughout the United States, including within the Eastern District of Virginia. Consumers and businesses located within this judicial district do, in fact, use Patriot's methods and apparatuses.

18. Patriot has been notified of the patents-in-suit and the relevance of the patents to Patriot's ongoing business operations, but to date Patriot has refused to take a license under reasonable terms.

19. Enterprise advertises and uses a nationwide telephone number for its customers to call and be connected to their nearest Enterprise rental location (i.e., a Single Number Service). The phrases "Single Number Service," "single number service," and the acronym "SNS" are generic industry terms for such types of telephone number services. Enterprise's Single Number Service is intended and is available for use by consumers and businesses located throughout the United States, including within the Eastern District of Virginia. Consumers and businesses located within this judicial district do, in fact, use Enterprise's Single Number Service.

20. Upon information and belief, Enterprise uses and has used infringing Single Number Services provided by defendants Patriot and McLeod.

21. Upon information and belief, Enterprise further generates, or directs the generation of, rental location databases, files, tables, lists, or other such data compilations and/or provides the necessary rental location information for use in the Single Number Services.

22. Enterprise has been notified of the patents-in-suit and the relevance of the patents to Enterprise's ongoing business operations, but to date Enterprise has refused to take a license under reasonable terms.

COUNT ONE – INFRINGEMENT OF THE '267 PATENT

(All Defendants)

23. Plaintiffs re-allege and incorporate herein by reference Paragraphs 1 through 22 as though fully set forth herein.

24. The '267 Patent, which duly and legally issued on July 12, 1988, relates to systems and methods for connecting a customer to a supplier of goods.

25. Murex Licensing is the sole owner of the entire right, title, and interest in the '267 Patent.

26. Defendant McLeod has directly infringed, and has induced others to infringe, one or more

claims of the '267 Patent through at least the act of operating and using methods and apparatuses in the United States that connect customers to suppliers of goods. McLeod continues to directly infringe and induce others to infringe the '267 Patent.

27. Defendant Patriot has directly infringed, and has induced others to infringe, one or more claims of the '267 Patent through at least the act of operating and using methods and apparatuses in the United States that connect customers to suppliers of goods. Patriot continues to directly infringe and induce others to infringe the '267 Patent.

28. Defendant Enterprise has directly infringed, and has induced others to infringe, one or more claims of the '267 Patent through at least the act of operating and using methods and apparatuses in the United States that connect customers to suppliers of goods. Enterprise continues to directly infringe and induce others to infringe the '267 Patent.

29. Infringement by defendants has been willful.

30. Plaintiffs have been, and will continue to be, damaged and irreparably harmed by defendants' infringement, which will continue unless defendants are enjoined by this Court.

COUNT TWO - INFRINGEMENT OF THE '897 PATENT

(All Defendants)

31. Plaintiffs re-allege and incorporate herein by reference Paragraphs 1 through 30 as though fully set forth herein.

32. The '897 Patent, which duly and legally issued on April 9, 1996, relates to systems and methods for automatically routing telephone calls across a telephone network.

33. Murex Securities is the sole owner of the entire right, title, and interest in the '897 Patent. Murex Licensing is the exclusive licensee of the '897 Patent and is authorized to enforce the '897 Patent.

34. Defendant McLeod has directly infringed, and has induced others to infringe, one or more claims of the '897 Patent through at least the act of operating and using methods and apparatuses in the United States that automatically route telephone calls across a telephone network. McLeod continues to directly infringe and induce others to infringe the '897 Patent.

35. Defendant Patriot has directly infringed, and has induced others to infringe, one or more claims of the '897 Patent through at least the act of operating and using methods and apparatuses in the United States that automatically route telephone calls across a telephone network. Patriot continues to

directly infringe and induce others to infringe the '897 Patent.

36. Defendant Enterprise has directly infringed, and has induced others to infringe, one or more claims of the '897 Patent through at least the act of operating and using methods and apparatuses in the United States that automatically route telephone calls across a telephone network. Upon information and belief, Enterprise has further directly infringed, and has induced others to infringe, one or more claims of the '897 Patent through at least the act of generating, or directing an agent to generate, rental location databases, files, tables, lists, or other such data compilations, or providing the necessary rental location information for its local Single Number Services. Enterprise continues to directly infringe and induce others to infringe the '897 Patent.

37. Infringement by defendants has been willful.

38. Plaintiffs have been, and will continue to be, damaged and irreparably harmed by defendants' infringement, which will continue unless defendants are enjoined by this Court.

COUNT THREE – INFRINGEMENT OF THE '131 PATENT

(McLeod)

39. Plaintiffs re-allege and incorporate herein by reference Paragraphs 1 through 38 as though fully set forth herein.

40. The '131 Patent, which duly and legally issued on December 8, 1998, relates to systems and methods for automatically providing information about a service location and/or routing telephone calls across a telephone network.

41. Murex Securities is the sole owner of the entire right, title, and interest in the '131 Patent. Murex Licensing is the exclusive licensee of the '131 Patent and is authorized to enforce the '131 Patent.

42. Defendant McLeod has directly infringed, and has induced others to infringe, one or more claims of the '131 Patent through at least the act of operating and using methods and apparatuses in the United States that automatically provide information about a service location and/or route telephone calls across a telephone network. McLeod continues to directly infringe and induce others to infringe the '131 Patent.

43. Infringement by defendant McLeod has been willful.

44. Plaintiffs have been, and will continue to be, damaged and irreparably harmed by defendant McLeod's infringement, which will continue unless defendant McLeod is enjoined by this Court.

COUNT FOUR – INFRINGEMENT OF THE '214 PATENT

(McLeod)

45. Plaintiffs re-allege and incorporate herein by reference Paragraphs 1 through 44 as though fully set forth herein.

46. The '214 Patent, which duly and legally issued on May 4, 1999, relates to one number intelligent call processing systems and methods.

47. Murex Securities is the sole owner of the entire right, title, and interest in the '214 Patent. Murex Licensing is the exclusive licensee of the '214 Patent and is authorized to enforce the '214 Patent.

48. Defendant McLeod has directly infringed, and has induced others to infringe, one or more claims of the '214 Patent through at least the act of operating and using methods and apparatuses in the United States that automatically route telephone calls across a telephone network and/or provide information about a service location. McLeod continues to directly infringe and induce others to infringe the '214 Patent.

49. Infringement by defendant McLeod has been willful.

50. Plaintiffs have been, and will continue to be, damaged and irreparably harmed by defendant McLeod's infringement, which will continue unless defendant McLeod is enjoined by this Court.

COUNT FIVE – INFRINGEMENT OF THE '608 PATENT

(All Defendants)

51. Plaintiffs re-allege and incorporate herein by reference Paragraphs 1 through 50 as though fully set forth herein.

52. The '608 Patent, which duly and legally issued on May 25, 1999, relates to systems and methods for automatically routing telephone calls across a telephone network.

53. Murex Securities is the sole owner of the entire right, title, and interest in the '608 Patent. Murex Licensing is the exclusive licensee of the '608 Patent and is authorized to enforce the '608 Patent.

54. Defendant McLeod has directly infringed, and has induced others to infringe, one or more claims of the '608 Patent through at least the act of operating and using methods and apparatuses in the United States that automatically route telephone calls across a telephone network. McLeod continues to directly infringe and induce others to infringe the '608 Patent.

55. Defendant Patriot has directly infringed, and has induced others to infringe, one or more claims of the '608 Patent through at least the act of operating and using methods and apparatuses in the United States that automatically route telephone calls across a telephone network. Patriot continues to

directly infringe and induce others to infringe the '608 Patent.

56. Defendant Enterprise has directly infringed, and has induced others to infringe, one or more claims of the '608 Patent through at least the act of operating and using methods and apparatuses in the United States that automatically route telephone calls across a telephone network. Upon information and belief, Enterprise has further directly infringed, and has induced others to infringe, one or more claims of the '608 Patent through at least the act of generating, or directing an agent to generate, rental location databases, files, tables, lists, or other such data compilations, or providing the necessary rental location information for its local Single Number Services. Enterprise continues to directly infringe and induce others to infringe the '608 Patent.

57. Infringement by defendants has been willful.

58. Plaintiffs have been, and will continue to be, damaged and irreparably harmed by defendants' infringement, which will continue unless defendants are enjoined by this Court.

COUNT SIX – INFRINGEMENT OF THE '982 PATENT

(All Defendants)

59. Plaintiffs re-allege and incorporate herein by reference Paragraphs 1 through 58 as though fully set forth herein.

60. The '982 Patent, which duly and legally issued on June 8, 1999, relates to systems and methods for automatically routing telephone calls across a telephone network and optionally providing information about a service location.

61. Murex Securities is the sole owner of the entire right, title, and interest in the '982 Patent. Murex Licensing is the exclusive licensee of the '982 Patent and is authorized to enforce the '982 Patent.

62. Defendant McLeod has directly infringed, and has induced others to infringe, one or more claims of the '982 Patent through at least the act of operating and using methods and apparatuses in the United States that automatically route telephone calls across a telephone network and optionally provide information about a service location. McLeod continues to directly infringe and induce others to infringe the '982 Patent.

63. Defendant Patriot has directly infringed, and has induced others to infringe, one or more claims of the '982 Patent through at least the act of operating and using methods and apparatuses in the United States that automatically route telephone calls across a telephone network and optionally provide information about a service location. Patriot continues to directly infringe and induce others to infringe the '982 Patent.

64. Defendant Enterprise has directly infringed, and has induced others to infringe, one or more claims of the '982 Patent through at least the act of

operating and using methods and apparatuses in the United States that automatically route telephone calls across a telephone network and optionally provide information about a service location. Enterprise continues to directly infringe and induce others to infringe the '982 Patent.

65. Infringement by defendants has been willful.

66. Plaintiffs have been, and will continue to be, damaged and irreparably harmed by defendants' infringement, which will continue unless defendants are enjoined by this Court.

COUNT SEVEN – INFRINGEMENT OF THE '397 PATENT

(All Defendants)

67. Plaintiffs re-allege and incorporate herein by reference Paragraphs 1 through 66 as though fully set forth herein.

68. The '397 Patent, which duly and legally issued on September 21, 1999, relates to systems and methods for automatically routing telephone calls across a telephone network and optionally providing information about a service location.

69. Murex Securities is the sole owner of the entire right, title, and interest in the '397 Patent. Murex Licensing is the exclusive licensee of the '397 Patent and is authorized to enforce the '397 Patent.

70. Defendant McLeod has directly infringed, and has induced others to infringe, one or more claims of the '397 Patent through at least the act of operating and using methods and apparatuses in the United States that automatically route telephone calls across a telephone network and optionally provide information about a service location. McLeod continues to directly infringe and induce others to infringe the '397 Patent.

71. Defendant Patriot has directly infringed, and has induced others to infringe, one or more claims of the '982 Patent through at least the act of operating and using methods and apparatuses in the United States that automatically route telephone calls across a telephone network and optionally provide information about a service location. Patriot continues to directly infringe and induce others to infringe the '397 Patent.

72. Defendant Enterprise has directly infringed, and has induced others to infringe, one or more claims of the '397 Patent through at least the act of operating and using methods and apparatuses in the United States that automatically route telephone calls across a telephone network and optionally provide information about a service location. Enterprise continues to directly infringe and induce others to infringe the '397 Patent.

73. Infringement by defendants has been willful.

74. Plaintiffs have been, and will continue to be, damaged and irreparably harmed by defendants' infringement, which will continue unless defendants are enjoined by this Court.

COUNT EIGHT – INFRINGEMENT OF THE '868 PATENT

(McLeod)

75. Plaintiffs re-allege and incorporate herein by reference Paragraphs 1 through 74 as though fully set forth herein.

76. The '868 Patent, which duly and legally issued on December 9, 1999, relates to systems and methods for automatically routing telephone calls across a telephone network and/or providing information about a service location.

77. Murex Securities is the sole owner of the entire right, title, and interest in the '868 Patent. Murex Licensing is the exclusive licensee of the '868 Patent and is authorized to enforce the '868 Patent.

78. Defendant McLeod has directly infringed, and has induced others to infringe, one or more claims of the '868 Patent through at least the act of operating and using methods and apparatuses in the United States that automatically route telephone calls across a telephone network and/or provide information about a service location. McLeod continues to directly infringe and induce others to infringe the '868 Patent.

79. Infringement by defendant McLeod has been willful.

80. Plaintiffs have been, and will continue to be, damaged and irreparably harmed by defendant McLeod's infringement, which will continue unless defendant McLeod is enjoined by this Court.

COUNT NINE – INFRINGEMENT OF THE '179 PATENT

(All Defendants)

81. Plaintiffs re-allege and incorporate herein by reference Paragraphs 1 through 80 as though fully set forth herein.

82. The '179 Patent, which duly and legally issued on May 2, 2000, relates to one number intelligent call processing systems and methods.

83. Murex Securities is the sole owner of the entire right, title, and interest in the '179 Patent. Murex Licensing is the exclusive licensee of the '179 Patent and is authorized to enforce the '179 Patent.

84. Defendant McLeod has directly infringed, and has induced others to infringe, one or more claims of the '179 Patent through at least the act of operating and using methods and apparatuses in the United States that automatically route telephone calls across a telephone network and optionally provide information about a service location. McLeod

continues to directly infringe and induce others to infringe the '179 Patent.

85. Defendant Patriot has directly infringed, and has induced others to infringe, one or more claims of the '179 Patent through at least the act of operating and using methods and apparatuses in the United States that automatically route telephone calls across a telephone network and optionally provide information about a service location. Patriot continues to directly infringe and induce others to infringe the '179 Patent.

86. Defendant Enterprise has directly infringed, and has induced others to infringe, one or more claims of the '179 Patent through at least the act of operating and using methods and apparatuses in the United States that automatically route telephone calls across a telephone network and optionally provide information about a service location. Enterprise continues to directly infringe and induce others to infringe the '179 Patent

87. Infringement by defendants has been willful.

88. Plaintiffs have been, and will continue to be, damaged and irreparably harmed by defendants' infringement, which will continue unless defendants are enjoined by this Court.

COUNT TEN – INFRINGEMENT OF THE '810 PATENT

(McLeod)

89. Plaintiffs re-allege and incorporate herein by reference Paragraphs 1 through 88 as though fully set forth herein.

90. The '810 Patent, which duly and legally issued on July 18, 2000, relates to systems and methods for automatically routing telephone calls across a telephone network and optionally providing information about a service location.

91. Murex Securities is the sole owner of the entire right, title, and interest in the '810 Patent. Murex Licensing is the exclusive licensee of the '810 Patent and is authorized to enforce the '810 Patent.

92. Defendant McLeod has directly infringed, and has induced others to infringe, one or more claims of the '810 Patent through at least the act of operating and using methods and apparatuses in the United States that automatically route telephone calls across a telephone network and/or provide information about a service location. McLeod continues to directly infringe and induce others to infringe the '810 Patent.

93. Infringement by defendant McLeod has been willful.

94. Plaintiffs have been, and will continue to be, damaged and irreparably harmed by defendant

McLeod's infringement, which will continue unless defendant McLeod is enjoined by this Court.

REQUEST FOR RELIEF

WHEREFORE, Plaintiffs request the following relief:

A. a judgment that each defendant has infringed the '267, '897, '608, '982, '397, and '179 Patents;

B. a judgment that defendant McLeod has also infringed the '131, '214, '868 and '810 Patents;

C. an accounting for damages resulting from defendants' infringement of the patents-in-suit, together with pre-judgment and post-judgment interest;

D. a judgment that defendants knowingly and willfully engaged in such infringement, and a trebling of damages pursuant to 35 U.S.C. § 284;

E. a permanent injunction against defendants, their officers, agents, servants, employees, attorneys, parent and subsidiary corporations, assigns and successors in interest, and those persons in active concert or participation with them, enjoining them from continued acts of infringement of the patents-in-suit;

F. a judgment holding this Action to be an exceptional case, and an award to Plaintiffs for their attorneys' fees and costs pursuant to 35 U.S.C. § 285; and

G. such other relief as the Court deems just and equitable.

Dated: November 4, 2002

Respectfully submitted,

MUREX SECURITIES LIMITED and MUREX LICENSING CORPORATION

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JURY DEMAND

Plaintiffs demand a trial by jury of all matters to which it is entitled to trial by jury, pursuant to Fed. R. Civ. P. 38.

Dated: November 4, 2002

Respectfully submitted,

MUREX SECURITIES LIMITED and MUREX LICENSING CORPORATION

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UNITED STATES DISTRICT COURT
MIDDLE DISTRICT OF FLORIDA
ORLANDO DIVISION

800 ADEPT, INC., a Florida corporation, Plaintiff, v. MUREX SECURITIES, LTD., an Isle of Man limited company; MUREX LICENSING CORPORATION, a Delaware corporation; TARGUS INFORMATION CORPORATION, a corporation; and WEST CORPORATION, a corporation, Defendants.	Case No. 6:02-cv-1354-Orl-28-DAB

DEFENDANTS' MEMORANDUM IN SUPPORT OF THEIR COMBINED MOTIONS TO DISMISS ALL COUNTS AGAINST MUREX SECURITIES AND MUREX LICENSING FOR LACK OF PERSONAL JURISDICTION AND TO TRANSFER VENUE TO THE EASTERN DISTRICT OF VIRGINIA

(Filed Dec. 17, 2002)

I. INTRODUCTION

This case should not proceed in this Court for two fundamental reasons. First, this Court does not have personal jurisdiction over Murex Securities Limited

and Murex Licensing Corporation and, therefore, must dismiss all counts (I through VII) as to these defendants. Second, this Court can and should transfer this case under 28 U.S.C. §§ 1404(a) or 1631 for consolidation with an earlier filed lawsuit by Murex Securities and Murex Licensing.[1] All the issues in 800 Adept's complaint in this case are either completely or substantially duplicative of issues in the earlier filed lawsuit currently pending in the United States District Court for the Eastern District of Virginia (the "Virginia Action"). The Virginia Action provides the only forum in which a single court can resolve all issues in the complaint in this ease. Indeed, this case is virtually a mirror image of the Virginia Action (captioned *Murex Securities Limited and Murex Licensing Corporation v. Enterprise Rent-A-Car Corporation, Patriot Communications LLC, McLeod USA Incorporated, and 800 Adept, Inc.*, Case No. 2:02cv00865). Both suits involve the same patents and accused technology. Both suits will inevitably involve duplicative discovery, pleadings, motions, and briefs. Unless consolidated, there will be two separate actions that will each require a district court to conduct the same hearings, review the same arguments, and enter orders on the same issues (such as claim construction, infringement and validity).

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[1] Each of the Defendants join or consent in this motion to transfer the case to the Eastern District of Virginia.

When duplicative proceedings exist, "[t]he court with prior jurisdiction over the common subject matter, should resolve all issues presented in related actions." *R.E.I. Golf Co. v. Roberts Metals, Inc.*, 24 U.S.P.Q.2d 1070, 1992 U.S. Dist. LEXIS 10137 at *6 (M.D. Fla. June 29, 1992). The Eastern District of Virginia is the court with prior jurisdiction over the common subject matter of these cases and, therefore, should resolve all of the issues presented in these cases.

II. BACKGROUND FACTS.

A. Overview Of The Virginia Action.

1. The Parties.

The Virginia Action was commenced on November 4, 2002, when Murex Securities and Murex Licensing filed a complaint for patent infringement in the Eastern District of Virginia against Enterprise Rent-A-Car Company ("Enterprise"), McLeodUSA Incorporated ("McLeod"), and Patriot Communications LLC ("Patriot"). *See* Ex. A. Eighteen days later, on November 22, 2002, before any defendant had filed an answer, Murex Securities and Murex Licensing filed an amended complaint adding 800 Adept, Inc. ("800 Adept") as a defendant in the Virginia Action. *See* Ex. B. Murex Securities and Murex Licensing allege in the Virginia Action that 800 Adept and its clients or licensees (Enterprise, McLeod and Patriot) infringe one or more claims of ten different patents.

Murex Securities, the owner of nine of the ten patents asserted in the Virginia Action, is a venture capital and investment company located overseas. *See* Ex. C at ¶ 4, 5. Murex Licensing is the owner of the remaining patent asserted in the Virginia Action and also is the exclusive licensee to the patents owned by Murex Securities. *Id.* Murex Licensing has its principal place of business in Vienna, Virginia, within the Eastern District of Virginia. *Id.* at ¶ 5.

800 Adept has its principal place of business in Florida. Enterprise is headquartered in St. Louis, Missouri. Patriot is located in Culver City, California. McLeod is based in Cedar Rapids, Iowa. *See* Ex. B.

2. The Patents In Suit.

The inventors of nine of the ten patents asserted in the Virginia Action are Mr. James Shaffer and Dr. George Moore. Ex. C at ¶ 7. Mr. Shaffer and Dr. Moore founded a company called TARGUS Information Incorporated ("TARGUSinfo") in 1992 to commercialize their patented technology. *Id.* Pursuant to an initial funding arrangement between Murex Securities and TARGUSinfo, the patents on the Shaffer and Moore inventions were assigned to Murex Securities. *Id.* The other patent at issue in the Virginia Action, U.S. Patent No. 4,757,267 ("the '267 Patent"), was purchased and assigned to Murex Licensing. *Id.* at ¶ 4. The ten patents asserted in the Virginia Action are collectively referred to as the "Murex Patents."

The Murex Patents relate to a field known as Geographic Information Systems ("GIS"). *Id.* at ¶ 10. As the name implies, GIS uses (among other things) computer systems, tools and techniques for gathering, analyzing, and manipulating location-based information. *Id.*

Mr. Shaffer and Dr. Moore have worked for more than 25 years in the GIS field. *Id.* at ¶ 11. On February 22, 1993, Mr. Shaffer and Dr. Moore filed their first patent application in the United States Patent and Trademark Office disclosing novel technology that allows customers to search for and locate business locations nearest to them, and that routes the customer's telephone call to that rental or service location. *Id.* That patent application ultimately issued on April 9, 1996 as U.S. Patent No. 5,506,897 (one of the Murex Patents in suit). *Id.* Mr. Shaffer and Dr. Moore continued to develop and expand their technology and obtained additional patents to cover these technologies, including eight other Murex Patents asserted in the Virginia Action. *Id.*

3. The Accused Technology, Systems And Methods Of 800 Adept And Its Clients Or Licensees.

800 Adept is in the business of providing products and services for telephone call routing. Enterprise is one of 800 Adept's customers. *Id.* at ¶ 12. As part of its relationship with Enterprise, 800 Adept receives information from Enterprise about the

locations of the Enterprise dealers. *Id.* 800 Adept then uses the Enterprise dealer location information to build a database for the 1-800-Rent-A-Car telephone call routing service. *Id.*

The database built by 800 Adept for Enterprise is provided to McLeod. *Id.* at ¶ 13. McLeod is the telecommunications company that handles the calls to the Enterprise 1-800-Rent-A-Car telephone number. *Id.* When an Enterprise customer calls the 1-800-Rent-A-Car telephone number, the call goes to a McLeod facility. *Id.* McLeod uses the 800 Adept database to provide dealer location services for Enterprise, which includes speaking information to the caller and an option to route the call to the Enterprise location closest to the caller. *Id.*

Both McLeod and Patriot also use data provided by 800 Adept to provide telephone call routing services for customers other than Enterprise. *Id.* at ¶ 14. For example, McLeod uses a database provided by 800 Adept to look up a geospatial key for a caller, which McLeod then uses to determine how to route the call to the correct location. *Id.*

4. The Murex Patents Also Were Asserted Within The Last Year In Two Prior Lawsuits In The Eastern District Of Virginia.

Murex Securities and Murex Licensing had filed two separate complaints for patent infringement involving most of the same Murex Patents now at

issue in both the Virginia Action and this action. *Id.* at ¶ 15. On December 13, 2001, Murex Licensing and Murex Securities filed a complaint for patent infringement in the United District Court for the Eastern District of Virginia, Civil Action No. 01-1895-A, against Vicinity Corporation, Pizza Hut, Inc., Domino's Inc., Domino's Pizza LLC, and Qwest Communications International, Inc. (the "Vicinity Action"). *Id.* Eight of the nine patents asserted against the defendants in the Vicinity Action are asserted in the presently pending Virginia Action. *Id.*

The Eastern District of Virginia court conducted a two-day *Markman* hearing in the Vicinity Action on April 4 and April 11, 2002. *Id.* at ¶ 16. On May 9, 2002, the Virginia district court issued an Order defining certain disputed claim terms in the patents at issue in the Vicinity Action. *Id.* One or more of the disputed claim terms defined in that Order appear in all of the claims in at least nine of the ten patents asserted in the presently pending Virginia Action, which are also the subject of 800 Adept's declaratory judgment claims in this Florida lawsuit. *Id.* The Vicinity Action was ultimately settled and dismissed on May 30, 2002. *Id.*

On April 8, 2002, Murex filed a complaint for patent infringement in the United District Court for the Eastern District of Virginia, Civil Action No. 02-498-A, against Pizza Hut, Inc. (the "Pizza Hut Action"). *Id.* at ¶ 17. All five patents asserted in the Pizza Hut Lawsuit are also asserted in the presently pending Virginia Action and also are the subject of

800 Adept's declaratory judgment claims in this Florida lawsuit. *Id.* Murex and Pizza Hut entered into a settlement agreement and the Pizza Hut Action was dismissed on September 26, 2002. *Id.*

B. Overview Of This Action.

This action is brought by 800 Adept on its own behalf as well as on the behalf of its "clients and licensees." 800 Adept initially filed, but never served, its complaint on November 18, 2002. 800 Adept filed an Amended Complaint on November 26, 2002, containing seven counts. *See* Ex. D.

Six of the seven counts (Counts II through VII) are asserted only against Murex Securities or Murex Licensing. In Count II, 800 Adept alleges that the claims of the Murex Patents interfere, *i.e.*, claim the same subject matter, as certain claims in patents owned by 800 Adept. In Counts III, IV and V, 800 Adept seeks a declaratory judgment that neither it nor its "clients and licensees" infringe any of the Murex Patents (identifying seven of the ten patents asserted in the Virginia Action). In Count VI, 800 Adept seeks a declaratory judgment that the Murex Patents asserted against 800 Adept and its "clients and licensees" are invalid. In Count VII, 800 Adept alleges that Murex Securities and Murex Licensing have tortiously interfered "with contractual relations between [800 Adept] and its clients and licensees." This claim is based solely on the fact that Murex Securities and Murex Licensing have filed suit for patent infringement in the Virginia Action against

clients of and licensees of 800 Adept (which could only refer to Enterprise, McLeod and Patriot).

In addition to the Counts II through VII asserted only against Murex Securities or Murex Licensing, 800 Adept also alleges in Count I that Murex Securities, Murex Licensing, TARGUSinfo, and West Corporation ("West") infringe one or more claims of U.S. Patent No. 5,588,048, reissued as U.S. Patent No. RE 36,111, and U.S. Patent No. 5,805,689 (collectively referred to as the "800 Adept Patents"). 800 Adept alleges that West has licensed the Murex Patents from Murex Licensing or Murex Securities. That is incorrect. West does not have a license under any of the Murex Patents; rather, West purchases services from TARGUSinfo. *Id.* at ¶ 9.

* * *

VAIL

Vail Systems
570 Lake Cook Road
Deerfield, Illinois 60015
800 360 8245
www.vailsys.com

Pricing Options to meet data requirement
for call routing in the Direct Dispatch Service
Applications for the Allstate Motor Club

January 13, 2004

Introduction

Vail is pleased to tender this proposal for providing the data and reporting required for routing both landline and cellular calls for the AMC Direct Dispatch Service (DDS) to the nearest tower without operator intervention. For the last ten years Vail has provided the application, platform and reporting for the AMC DDS applications. During this time the application has used call routing data from a third party data provider under an agreement between the third party provider and Allstate. The purpose of this price proposal is to present Allstate with a competitive option for the data needs of the AMC DDS applications.

Solution

Land line calls: Vail will provide the data required for the mapping and routing of land line calls. Vail sources this data from a leading third-party data provider.

Cellular calls: Vail will adapt our existing Vail technology to provide routing on cellular calls for cases where the city and state alone is not granular enough for successfully routing the AMC member. For these calls, Vail will use publicly available data for city/state and address routing and, create and maintain the resulting grammars.

Database updates: In addition to the routing functionality for both cellular and land line calls, Vail will provide AMC DDS applications with regular updates to: a) the address grammars required for cellular routing and b) zip code and city/state databases.

Reporting: Vail will enhance our reporting suite to meet AMC's existing requirements including pre-compiling key reports on a daily, weekly and monthly basis with results available quickly through the Vail reporting web site.

Assumptions: It is assumed that AMC will continue to be responsible for updating towers, their severity level and the zip codes assigned to their service areas. Additionally it is assumed that Vail will be provided access to the AMC HP database.

Pricing

In order to present Allstate with the highest degree of flexibility, Vail presents two pricing models for review. The first model charges for successfully dispatched calls; the second model uses a cost plus model with a performance incentive for increased application efficiency.

* * *

UNITED STATES DISTRICT COURT
MIDDLE DISTRICT OF FLORIDA
ORLANDO DIVISION

CASE NO: 6:02-CV-1354-ORL-19DAB

800 ADEPT, INC., a Florida corporation,

PLAINTIFF,

VS.

MUREX SECURITIES, LTD.,
MUREX LICENSING CORPORATION,
TARGUS INFORMATION CORPORATION,
and WEST CORPORATION,

DEFENDANTs.

WEDNESDAY, OCTOBER 11, 2006
CIVIL JURY TRIAL – DAY 12
BEFORE THE HONORABLE
PATRICIA C. FAWSETT CHIEF UNITED
STATES DISTRICT COURT JUDGE, AND A JURY
ORLANDO, FLORIDA

[TESTIMONY OF MOORE]

* * *

[69] [Q.] When the declaration was filed, you were aware that you and Shaffer, as an inventor, had an obligation to tell the Patent Office that you had sold the invention to Federal Express Corporation and to explain why you waited more than a year before filing for your patent application?

A. We didn't sell the invention to Fed Ex, sir, we tested. And my understanding, when you file a patent ap, the technology has to be ready for patenting or work, and Fed Ex failed. It didn't work for its intended purpose, so it was . . .

* * *

Supreme Court, U.S.
FILED

08-859 JAN 5 - 2009

OFFICE OF THE CLERK

125 2

1/5/09

No. 08-859

In The

Supreme Court of the United States

800 ADEPT, INC.,

Petitioner,

v.

MUREX SECURITIES, LTD., MUREX LICENSING CORPORATION, TARGUS INFORMATION CORPORATION, and WEST CORPORATION,

Respondents.

On Petition For A Writ Of Certiorari To The United States Court Of Appeals For The Federal Circuit

APPENDIX TO PETITION FOR A WRIT OF CERTIORARI VOLUME II

RECEIVED
JAN 7 - 2009
OFFICE OF THE CLERK
SUPREME COURT, U.S.

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OR CALL COLLECT (402) 342-2831

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US 5,588,048 (Neville)	P - 000182
US 5,805,689 (Neville)	P - 000183
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US00RE36111E

United States Patent [19]

Neville

[11] E Patent Number: Re. 36,111

[45] Reissued Date of Patent: *Feb. 23, 1999

[54] **GEOGRAPHICALLY MAPPED TELEPHONE ROUTING METHOD AND SYSTEM**

[75] Inventor: **Daniel E. Neville**, Orlando, Fla.

[73] Assignee: **800 Adept, Inc.**, Altamonte Springs, Fla.

[*] Notice: The term of this patent shall not extend beyond the expiration date of Pat. No. 5,805,689.

[21] Appl. No.: **861,174**

[22] Filed: **May 21, 1997**

Related U.S. Patent Documents

Reissue of:

[64] Patent No.: **5,588,048**
Issued: **Dec. 24, 1996**
Appl. No.: **623,051**
Filed: **Mar. 28, 1996**

U.S. Applications:

[63] Continuation of Ser. No. 389,547, Feb. 15, 1995, abandoned, which is a continuation of Ser. No. 922,793, Jul. 31, 1992, abandoned.

[51] **Int. Cl.**[6] **H04M 3/42**

[52] **U.S. Cl.** **379/127**; 379/201; 379/207; 379/211; 379/220

[58] **Field of Search** 379/201, 207, 379/211, 212, 219, 220, 221, 209, 210, 265, 266, 67, 88, 89, 127, 142, 230, 111, 112, 113, 114, 115

[56] **References Cited**

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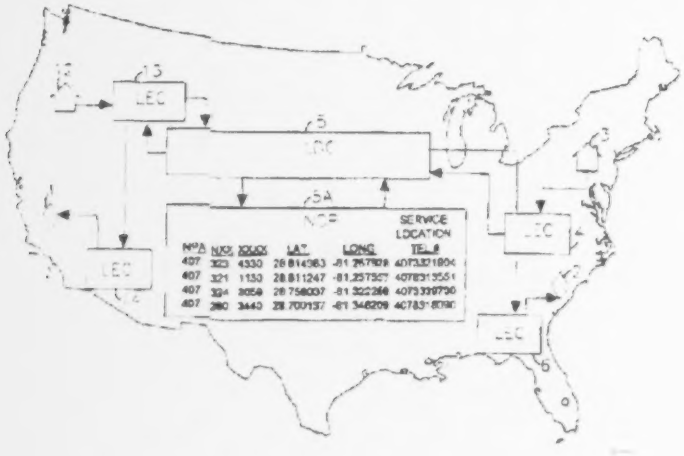
"Topological Integrated Geographic Encoding and Referencing System/Zone Improvement Plan," Tiger Technical Guide, pp. 3-5, Oct. 1991.

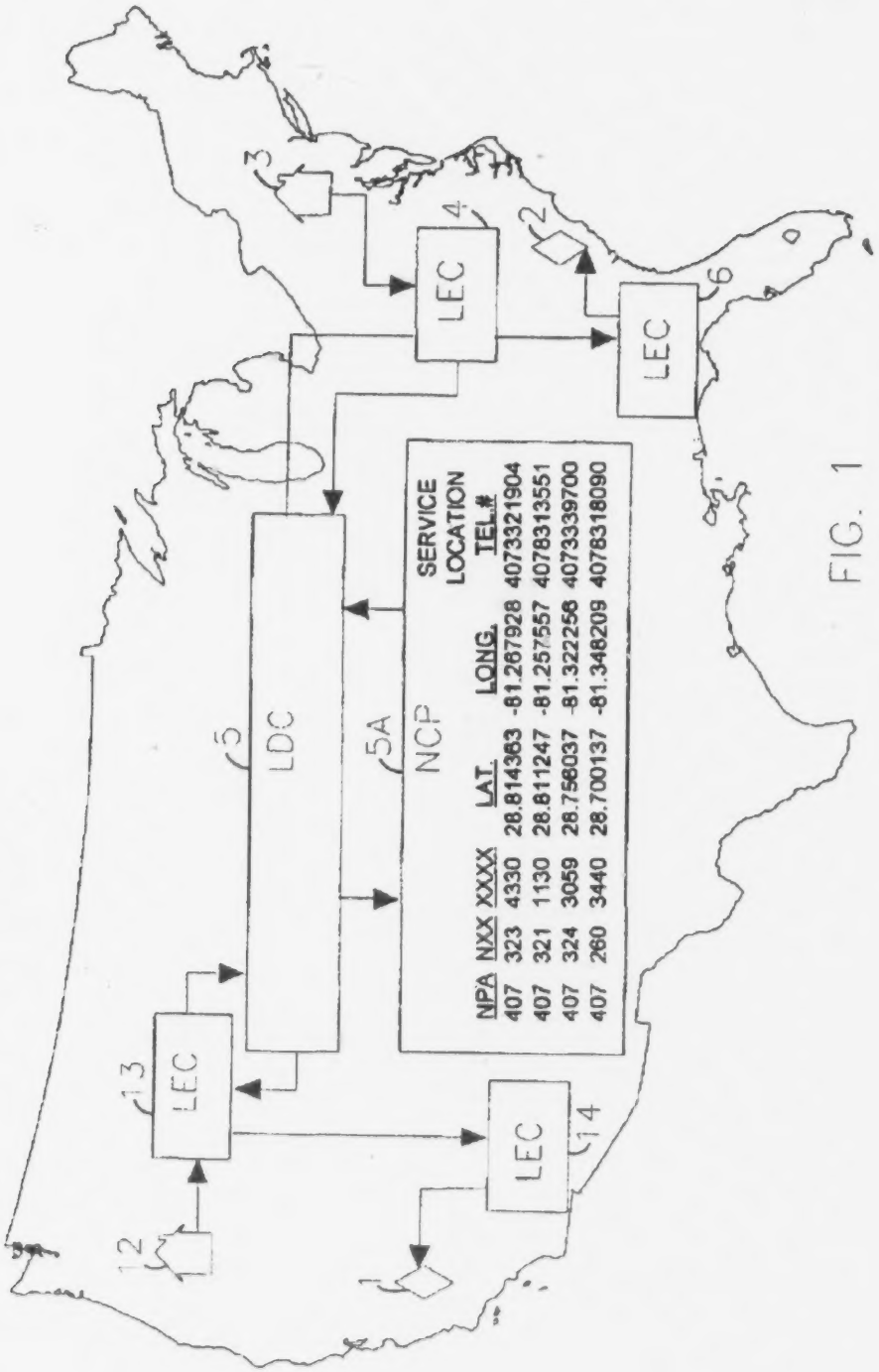
Primary Examiner—Ahmad F. Matar
Assistant Examiner—Scott Wolinsky
Attorney, Agent, or Firm—Edward M. Livingston, Esq.

[57] **ABSTRACT**

A method and system for direct routing of telephone calls made by a caller originating from within specific calling areas to one of a plurality of locations of a second party according to certain criteria established by the second party. This routing is accomplished based on the assignment of latitude and longitude coordinates to a potential caller's location. Once these coordinates are assigned to each of the potential callers, the second party's criteria is applied to assign the potential caller to a second party. Such criteria could be existence within a previously-defined geographic area, a custom defined geographic area, or through calculations such as the shortest distance between coordinate points. Once all such assignments have been made, a database is assembled to be used by a long distance carrier for direct routing of telephone calls from callers to an assigned second party.

52 Claims, 9 Drawing Sheets




LEC
LEC
LEC
LEC
LDC
NCP
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LONG.
LAT.
NXX XXXX
NPA
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407 321 1130 28.811247 -81.257557 4078313551
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1
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3
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5
5A
6
12
13
14

FIG. 1

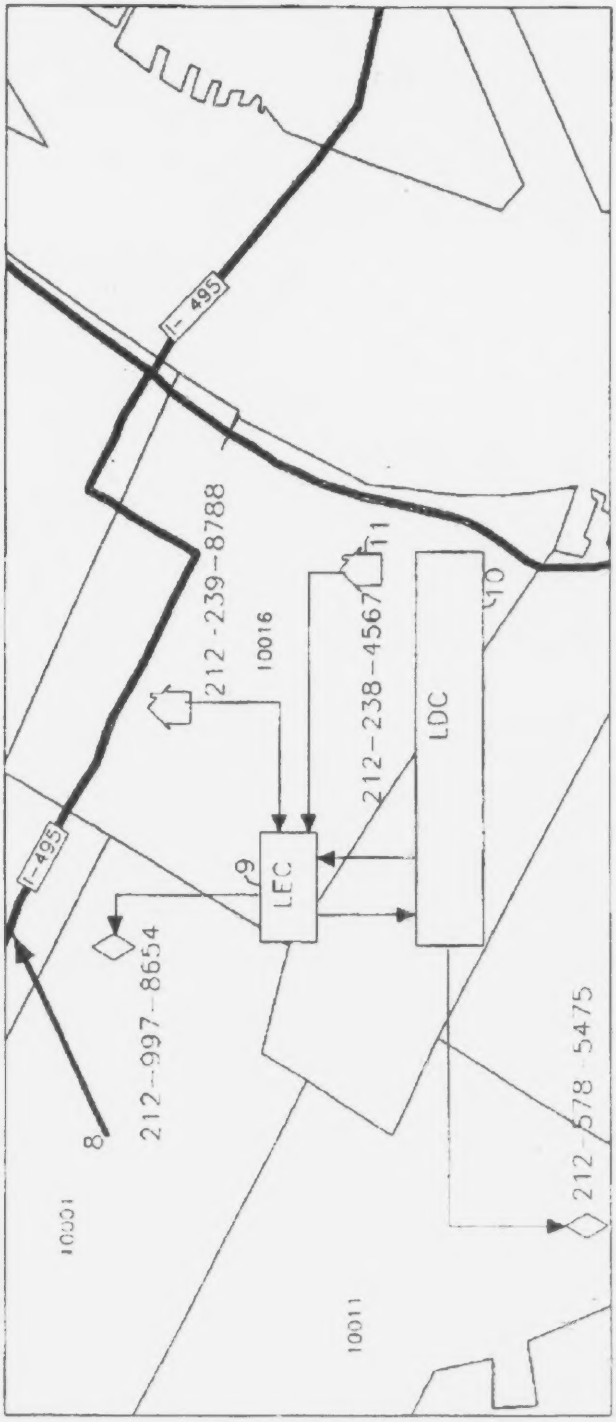
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FIG. 2

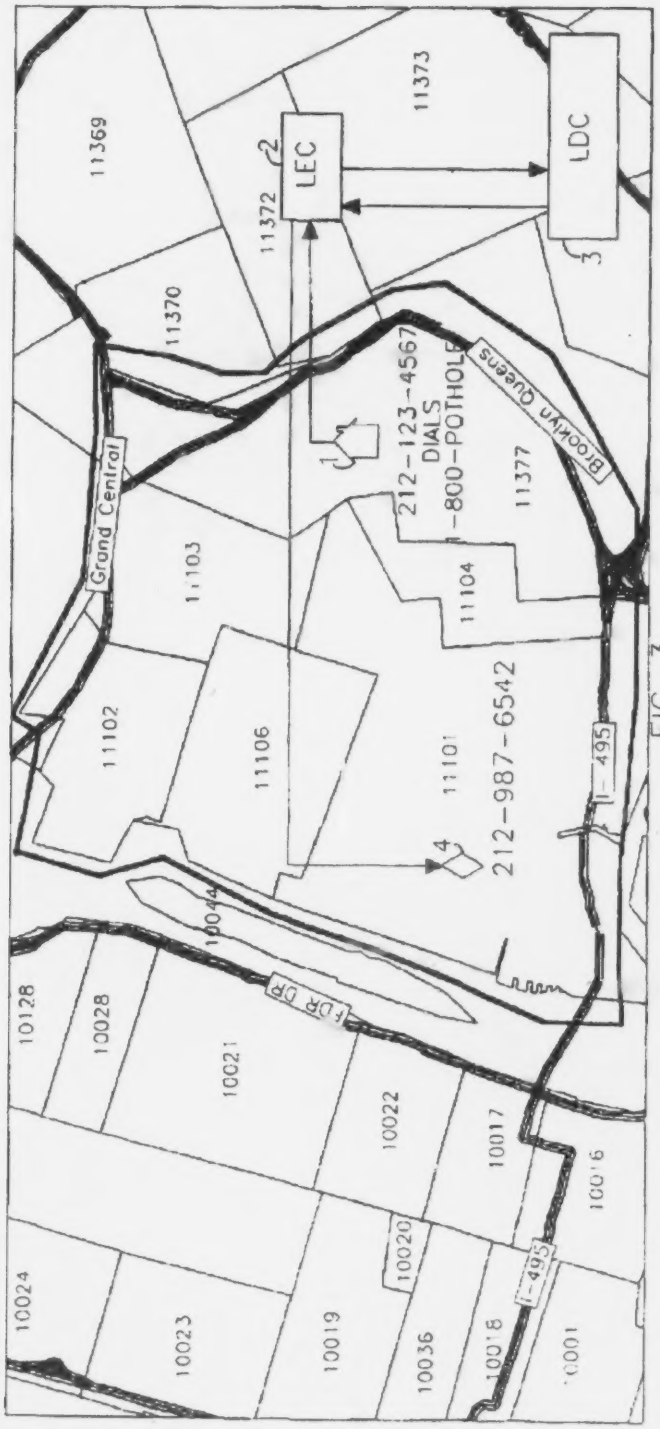
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FIG. 3

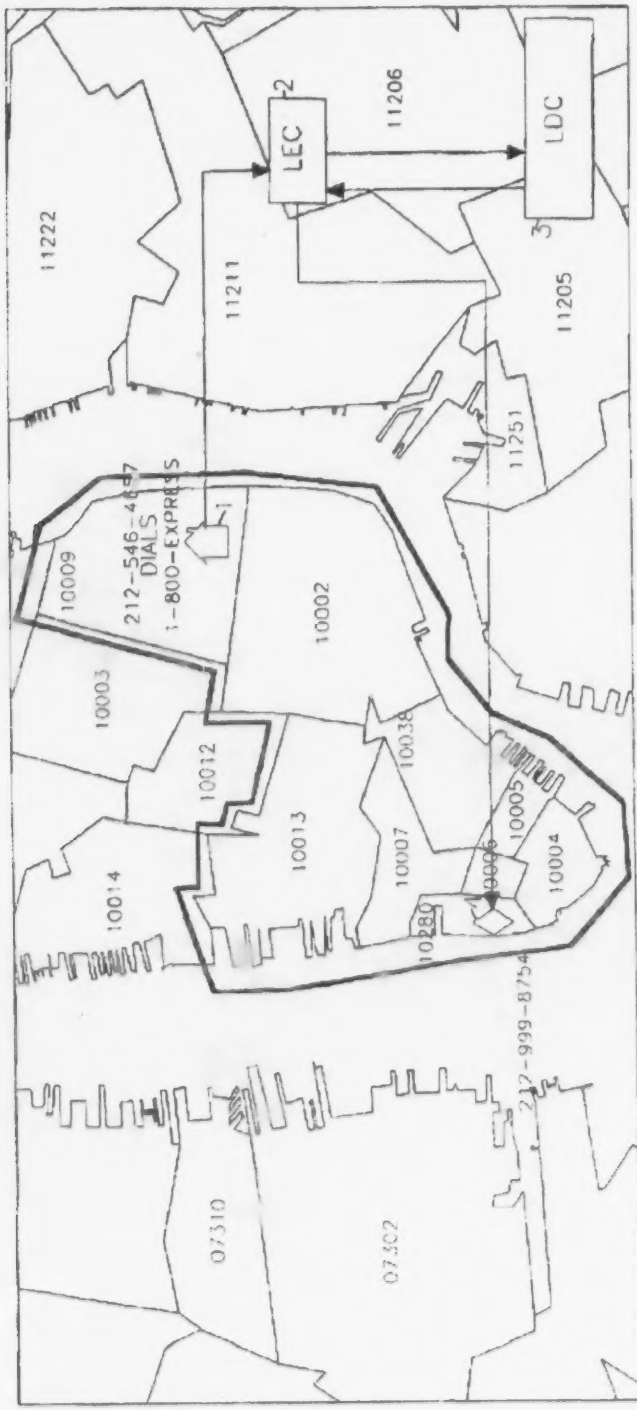
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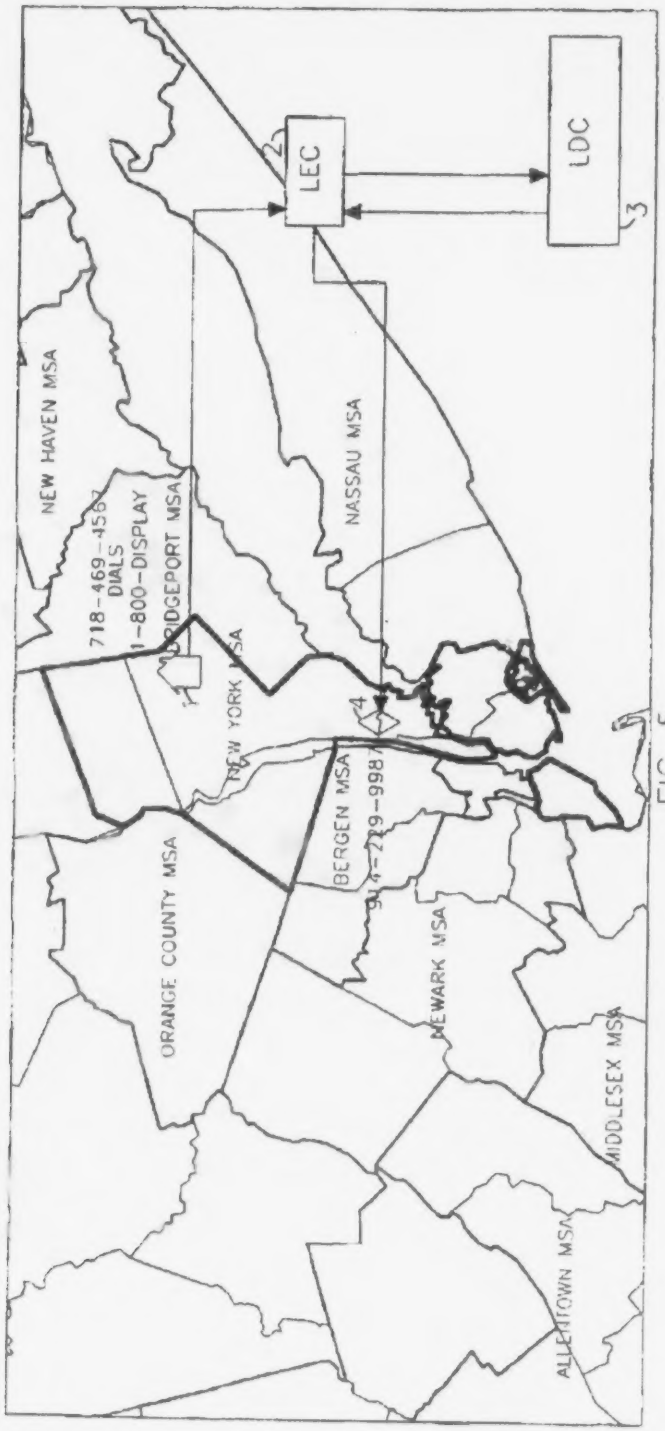
FIG. 4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NASSAU MSA
NEW YORK MSA
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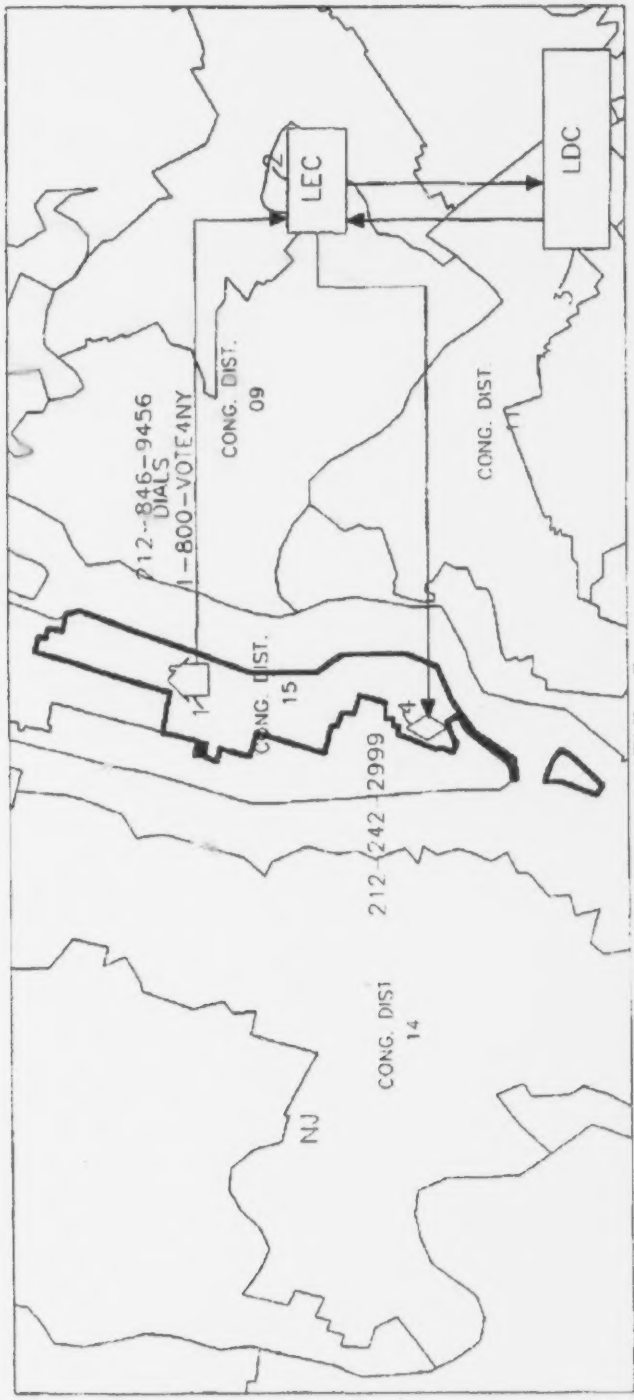
ORANGE COUNTY MSA
NEWARK MSA
MIDDLESEX MSA
ALLENTOWN MSA

FIG. 5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CONG. DIST 11
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14
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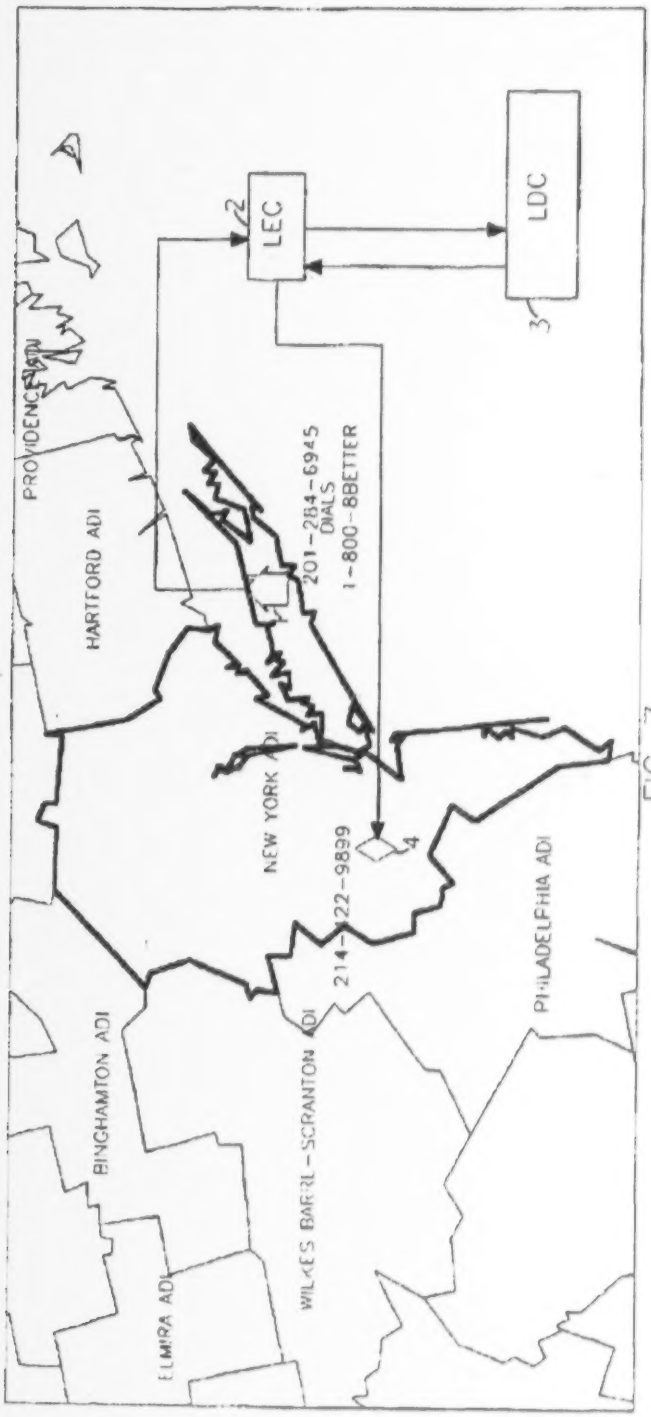
CONG. DIST 14
NJ

FIG. 6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PROVIDENCE ADI
HARTFORD ADI
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DIALS
1-800-8BETTER
NEW YORK ADI
4
214-922-9899
PHILADELPHIA ADI
BINGHAMTON ADI
WILKES BARRE-SCRANTON ADI
ELMIRA ADI

FIG. 7

NPA	NXX	ZIP		Plus4	Count	%
212	239	10017	-	3687	3471	52.74%
212	239	10017	-	6870	977	14.84%
212	239	10017	-	6872	966	14.68%
212	239	10017	-	0247	854	12.97%
212	239	10017	-	8561	187	2.84%
212	239	10017	-	2134	95	1.44%
212	239	10017	-	5428	32	0.49%
					6582	100.00%
212	239	10018	-	2687	523	30.62%
212	239	10018	-	7024	405	23.71%
212	239	10018	-	0687	378	22.13%
212	239	10018	-	5618	285	16.69%
212	239	10018	-	1342	99	5.80%
212	239	10018	-	8542	18	1.05%
					1708	100.00%
212	239	10017			6582	65.82%
212	239	10018			1708	17.08%
212	239	10001			502	5.02%
212	239	10016			1208	12.08%
					10000	100.00%

FIG.8

NPA	NXX	ZIP		Plus4	Count	%
212	239	10017	-	3687	3471	52.74%
212	239	10017	-	6870	977	14.84%
212	239	10017	-	6872	966	14.68%
212	239	10017	-	0247	854	12.97%
212	239	10017	-	8561	187	2.84%
212	239	10017	-	2134	95	1.44%
212	239	10017	-	5428	32	0.49%
212	239	10018	-	2687	523	30.62%
212	239	10018	-	7024	405	23.71%
212	239	10018	-	0687	378	22.13%
212	239	10018	-	5618	285	16.69%
212	239	10018	-	1342	99	5.80%
212	239	10018	-	8542	18	1.05%

FIG.9

GEOGRAPHICALLY MAPPED TELEPHONE ROUTING METHOD AND SYSTEM

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

CROSS-REFERENCE TO RELATED APPLICATIONS

This is a continuation of application Ser. No. 08/389,547, filed Feb. 15, 1995, now abandoned; which is a continuation of application Ser. No. 07/922,793, filed Jul. 31, 1992, now abandoned.

BACKGROUND OF THE INVENTION

The invention relates to systems for routing telephone calls and more particularly to a system for automatic direct routing of telephone calls from customers to the nearest or best provider of desired goods or services.

Organizations who advertise products or services are faced with the dilemma of how to direct connect those who have need of the advertiser's product or service and those who can provide the advertiser's product or service, while at the same time ensuring that the caller can be serviced from within the provider's designated territory of interest.

There is a well-recognized need for a system that can directly route a customer's call to a provider of the advertiser's product in whose territorial limits the call originates, and do so by providing the caller with a direct connection to the provider, without human intervention after dialing, and without need of a computer to redial and place the call. Many previous inventions have addressed the issue of call routing, but each of these involve either human intervention after the call is placed (either by the caller or by an operator at a remote location) or a computer-initiated redial of that call. Systems that require input by either an operator, the caller after the call is placed or a computer before the call is dispatched to the final destination are termed interactive systems.

One example of an interactive system in the prior art is U.S. Pat. No. 4,757,267 by Riskin, dated Jul. 12, 1988. Riskin describes a system whereby a caller and an operator or computer interact to determine one of several possible locations to which the call can be routed. An inbound call is matched to a database. If the number from which the caller is calling matches a number in the database, the computer initiates a second call to a nearby provider. If that phone is busy, the computer redials to an alternate location closest to the first. If there is no answer at the second location, the computer dials a third location, which is the closest to the second. Processing time for the computer under this system is slow due to the number of areas and steps required in the process, to wit:

1. The computer must compute the distance between the caller and the first provider;
2. An outbound call is placed by the computer to the provider;
3. If no connection is made, step 1 is repeated for an alternate location;
4. Step 2 is repeated;
5. If no connection is made, steps 1 and 2 are repeated for a second alternate location;
6. If no provider is available, an operator intervenes and prompts the caller for information, allowing the operator to select from several possible locations to which the outbound call can be placed, and
7. If the caller does not use a touch-tone phone, step 6, that is, the intervening of an operator, is required in all cases.

If the amount of computer interaction could be reduced by causing the call to be direct-routed, without an outbound call, to the proper location, processing time would be greatly reduced.

If the call could be direct-routed (not redialed) to the proper location when the call first reaches the Carrier to Routing Center (CRC), the CRC would be able to handle far more calls with a much higher degree of accuracy (100% of calls direct routed to the proper location on the first and only attempt).

If human interaction could be eliminated, fewer errors in call routing would occur, and the amount of time required to dispatch a call would be greatly reduced.

The foregoing patent also requires that the caller dial from a "touch-tone" telephone in order to identify the caller's number and redial the computer. Many areas of the United States and other countries use rotary telephones. With the foregoing patent, callers who only have access to rotary telephone service are required to interact with the operator. With other systems, those calling from rotary telephone services are unable to be connected to the destination.

U.S. Pat. No. 3,614,328 by McNaughton, et al. dated Oct. 19, 1971, describes another interactive system, whereby the caller is prompted to dial additional numbers after the initial call is made. The foregoing system does not provide direct and immediate connection to the provider in which the call has originated.

Remote Call Forwarding (RCF) does not provide the same service as does this invention, for RCF only identifies to where a call is to be routed. RCF does not have the ability to identify geographic proximity to the provider, nor whether the call originated from within a provider's territory.

Certainly there are a great many advertisers who use single telephone numbers, such as "1-800" numbers, in their national or regionalized advertising, without benefit of direct all routing. These advertisers must do one of two things:

1. Employ various types of service bureaus (or themselves) to identify a caller (and the caller's location) and provide the caller with the telephone number and/or location of the closest provider of the advertiser's product; or
2. Employ various types of service bureaus (or their own personnel) to identify the caller (and caller's location) and forward the caller's information to the appropriate provider.

If the caller does not place the call to the number provided, or if the integrity of the caller's information is corrupted enroute to the provider, all potential effects of the call are negated.

In the prior art no system exists that allows a caller to place a call to an advertiser's national or regional telephone number and be immediately connected to the provider closest to the caller, in whose territory the call originated, and in the provider's designated area of interest.

Further, there also does not exist a system that can provide direct routing information to a Long Distance Carrier (LDC), or other telephone carrier based on a wide variety of territorial criteria as may be established by various advertisers. Even further, there also does not exist a system that direct-connects the caller to the final location with a single "inbound" call.

The present invention, unlike the Riskin patent, does not require a second routing means but rather direct-connects the caller to the appropriate location after the caller has dialed a single regionally or nationally advertised telephone number (a "1-800" number, for example), with no further calls being initiated, whether by a human operator or by a computer. This invention works in conjunction with, and is an enhancement to, current services provided by the telephone carriers. The scope of the invention is of sufficient breadth and flexibility to accommodate future technological advances by the telephone carriers, such as cellular phone location identification by LORAN, for example.

SUMMARY OF THE INVENTION

The primary object of the present invention is to provide a reliable and cost-effective manner of directly connecting callers interested in an advertiser's product with providers of the advertiser's product in the area that the call originates during the time frame in which the caller has the highest degree of interest in the advertiser's product.

A corollary object of the present invention is to accomplish the above without need for intervention by a computer or human being.

The present invention accomplishes the above objects by providing a direct-routing system having location determining means, the parameters of which can be established by a provider of specific goods or services. In the system a caller's geographic location is identified by an Automatic Number Identification (ANI) which is then correlated with a database established according to criteria of a second party, usually an advertiser or provider of goods or services.

Additional features of the present invention include billing and reporting means based on connection number, time and activity.

The data base can be self-updating and self-generating according to the desires of the advertiser or provider.

The above and other objects, features and advantages will become more readily apparent when a detailed description of the preferred embodiments are described in conjunction with the accompanying drawing figures.

BRIEF DESCRIPTION OF THE DRAWINGS

The drawing figures used to illustrate the preferred embodiments are as follows:

FIG. 1 is a map of the United States showing application of the present invention in a wide geographical area;

FIG. 2 is a partial map showing application of the present invention by ZIP code;

FIG. 3 is a partial map showing application of the invention by highway boundaries;

FIG. 4 is a partial map showing application previously described with respect to a population base of 90,000 individuals per designated response zone;

FIG. 5 is another map demonstrating application of the invention by MSA;

FIG. 6 is a map demonstrating application of the invention by Congressional Districts;

FIG. 7 is a map used to demonstrate application of the invention by ADI;

FIG. 8 is a table of telephone area code and exchanges occurring in four (4) ZIP codes used for illustration purposes; and

FIG. 9 is a table showing a database of FIG. 8 after completion of initial processing using the system of this invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Before describing in detail the preferred embodiments of the invention, a glossary of terms and acronyms to be used is necessary as follows:

ADI Area of Demographic Influence.

ANI Automatic Number Identification. A caller's full telephone number.

CRI Carrier Routing Instructions. A database containing the NPA-NXX-XXXX and corresponding downlines for a particular advertiser.

CRC Carrier Routing Center. A telephone number of the provider to whom an advertiser wishes a call to be directed.

DRZ Designated Response Zone. The area from which an advertiser wishes to have telephone inquiries about the advertiser's product or service directed to the local provider of the advertiser's good or service.

GIS Geographic Information System. A computer program that provides visual interpretation of information represented by a coordinate system, typically but not necessarily latitude and longitude.

Interactive System. A non-direct telephone routing system that requires human input after a call has been made, and before the call is dispatched to the final destination.

LDC Long distance Carrier.

LEC Local Exchange Company.

MSA Metropolitan Statistical Area.

NCP Network Control Point at the LDC.

NPA The area code from which a call originates. This is also the first three digits of the ANI.

NXX The telephone exchange from which a call originates. The NXX immediately follows the NPA in the ANI.

POTS Plain Old Telephone Service. An individual telephone number.

WATS Wide Area Telephone Service. A long-distance number, characterized by the prefix "1-800" that allows for inbound and/or outbound charges to be billed to whom the number is assigned.

For purposes of describing the preferred embodiments in conjunction with the drawings, a hypothetical company, XYZ Diamond Brokers, is used. FIG. 1 shows the company has franchise locations in San Francisco, Calif. 1 and Hilton Head, S.C. 2. In the company's national advertising, it wishes to use the "1-800" number "1-800-DIAMOND" (1-800-342-6663) and to have nationwide calls go to the nearest local franchise location. Each location has a trade area that is proprietary to the franchisee. Franchise territories are as follows:

San Francisco—Washington State, Oregon, and California north of a line drawn at the northern boundaries of San Luis Obispo, Kern, and San Bernadino Counties.

Hilton Head—Pennsylvania, Maryland, Virginia, North Carolina, South Carolina.

A consumer in Philadelphia 3, who has the telephone number 215-652-3215, views the advertisement for XYZ Diamond Brokers and desires more information regarding the company's product. As instructed by the advertisement, the consumer calls "1-800-DIAMOND". The following sequence of events occurs:

1. The call goes to the Local Exchange Company (LEC) in Philadelphia for switching.

2. The LEC 4 recognizes the Wide Area Telephone (WATS) number, and opens a signalling channel to the Long Distance Carrier (LDC) 5 for translation of the WATS number to a Plain Old Telephone Service (POTS) number.
3. The LDC 5 accesses its own Network Control Point (NCP)SA, containing the invention's database, requesting a POTS number that corresponds to the LEC's WATS number. At the NCP are all of the direct routing instructions for the WATS number. As previously described, the NCP will provide a POTS number that will connect the caller to a territorial location, or a default phone location.
4. The LDC 5 then signals the LEC in Philadelphia 4 that the call must be switched to the LEC in Hilton Head 6, with a POTS number of 803-658-6549.
5. The LEC in Philadelphia 4 switches the call, along with the POTS information, to the LEC in Hilton Head 6.
6. The LEC in Hilton Head 6 completes the call.

There are no computer re-dials or additional calls made by the computer or an operator, as is the case in the prior patented art.

Likewise, a consumer in Oregon 12, who has the telephone number 503-854-9511, views an advertisement for XYZ Diamond Brokers and wishes to garner more information regarding the company's product As instructed by the advertisement, the consumer calls "1-800-DIAMOND". The following sequence of events occurs:

1. The call goes to the Local Exchange Company (LEC) in Oregon for switching.
2. The LEC 13 recognizes the "1-800" WATS (Wide Area Telephone Service) number and opens a signalling channel to the LDC 5 for translation of the WATS number to a Plain Old Telephone Service (POTS) number.
3. The LDC 5 accesses its own Network Control Point (NCP), containing the invention's database, requesting a POTS number that corresponds to the LEC's WATS number. At the NCP are all of the direct routing instructions for the WATS number. As previously described, the NCP will provide a POTS number that will connect the caller to a territorial location, or a default phone location.
4. The LDC 5 then signals the LEC 13 that the call must be switched to the LEC in San Francisco 14, with a POTS number of 415-964-7825.
5. The LEC in Oregon switches the call, along with the POTS information, to the LEC in San Francisco 14.
6. The LEC in San Francisco completes the call.

Also, unlike the prior patents, if a manufacturer has allocated its territories according to counties or to any plan other than telephone number, then the present invention will also work as illustrated in FIG. 2.

In FIG. 2 a consumer in the northern portion of ZIP code 10016, designated by 7, in an area that lies north of Interstate 495 8 in Manhattan N.Y., with a telephone number of 212-239-8788, sees the same ad as consumers in Portland and Philadelphia.

In actual use of the invention, it has been determined that while the area code exchanges ("NPA-NXX") 212–239 are located in ZIP codes 10001, 10018, 10017 and 10016, all of NPA-NXX 212–239 are located north of Interstate 495. By the definition of the franchise territory for the North Manhattan location, the calls from NPA-NXX 212–239 should go to the North Manhattan location. The alternate application would show that the ZIP Code Plus 4 for 212-239-8788 is 10016-XXXX, which is defined to be in the portion of 10016 that is north of Interstate 495.

As a matter of data validation, during database processing it was found that of the four ZIP codes in which NPA-NXX 212–239 occurs, the following distribution was present:

10001	5.02%
10016	12.08%
10018	17.08%
10017	65.82%

The ZIP Code Plus 4's in which NPA-NXX 212–239 occurred were all found to be north of a line formed by Interstate 495.

When the consumer dials "1-800-DIAMOND", the following events occur:

1. The call goes to the LEC 9 for switching, as previously described.
2. The LEC recognizes the WATS number, and opens a signalling channel to the LDC 10 for translation of the WATS number to a POTS number.
3. The LDC 10 signals the NCP, requesting a POTS number for the LEC's WATS number. As previously described, the NCP will provide a POTS number that corresponds to either a territorial or a default phone location.
4. The LDC 10 then signals the LEC 9 that the call must be switched to POTS number 212-997-8654.
5. The same LEC 9 in New York that signalled the LDC 10 switches the call to the final destination.

Let's assume that another consumer in New York 11, with the telephone number (ANI) 212-238-4567, sees the ad and decides to call 1-800-DIAMOND.

Database processing, as described above, has determined that this ANI should be direct routed to 212-578-5475.

When the consumer 11 dials "1-800-DIAMOND", the following events occur:

1. The call goes to the LEC 9 for switching, as previously described.
2. The LEC 9 recognizes the WATS number, and opens a signalling channel to the LDC 10 for translation of the WATS number to a POTS number.
3. The LDC 10 signals the NCP, requesting a POTS number for the LEC's WATS number. The NCP will provide a POTS number that corresponds to either a territorial or a default phone location.
4. The LDC 10 then signals the LEC 9 that the call must be switched to POTS number 212-578-5475.
5. The same LEC 9 in New York that signalled the LDC 10 switches the call to the final destination.

The present invention can also be used in conjunction with geographic boundaries other than ZIP code, state or area code, such as, bodies of water, streets/highways, railroads, congressional district, MSA, ADI, county, or city limits.

With the exception of cellular (mobile) telephones, every NPA-NXX-XXXX has an stationary address associated with it, and therefore a vertical and horizontal coordinate. Geographic locations of transportable phones will, in the near future, be identified by assignment of a vertical/horizontal coordinate, e.g., latitude and longitude, via a navigational or similar satellite communications system such as LORAN. In the event LDC's can accommodate the ANI and latitude and longitude concurrently, this invention can be employed to

direct route calls from non-stationary telephones to the appropriate territorial location. Because there is an address, the Post Office has assigned it to a ZIP code. Within the ZIP code, there can be up to 10,000 ZIP Code Plus 4 codes attached to the ZIP code. These ZIP Code Plus 4's allow the Post Office (and users of the invention) to identify an address (and an NPA-NXX-XXXX) side of the street and by a block range of the street. For example, ZIP Code Plus 4 12345-6788 represents 1000 through 1100 Main Street, odd house numbers, Anytown USA. By the same token ZIP Code Plus 4 12345-6789 represents 1000 through 1100 Main Street, even house numbers, Anytown USA.

By plotting these ZIP Code Plus 4 locations against any desired geographic boundary, either manually or with a Geographic Information System (GIS), and determining which ZIP Code Plus 4's lie within that boundary, the user of the invention to identify can appropriate NPA-NXX-XXXX combinations needed. Knowing which NPA-NXX-XXXX's reside within that geographic boundary allows the user of the invention to provide the direct routing instructions to an LDC.

The invention can also be implemented using combinations of geographic boundaries. A system has already been developed employing this invention, tested and implemented whereby an advertiser with four locations wished to assign the majority of his locations full county territories, while some adjacent territories shared NPA-NXX assignment within the same county. As previously described, the NPA-NXX assignments for each location were based on the geographic predominance of that NPA-NXX within the shared county. The alternate method would have assigned the individual NPA-NXX-XXXX's that resided in the respective territories.

FIG. 3 illustrates the application of the invention by highway boundaries. In this illustration, a county government wishes to utilize the invention by providing to citizens the telephone number 1-800-POTHOLE to report streets that are in need of repair. Citizens will be direct-connected to the office in their area responsible for roadway maintenance. Each office has a territory that has a boundary created by major highways. In the case of FIG. 3, the office is responsible for repairs in the area defined by Grand Central Parkway on the north, Brooklyn-Queens expressway on the east, Interstate 495 on the south, and the East river on the west.

A caller at 1 with the ANI 212-123-4567 dials 1-800-POTHOLE to report street damage after a storm. The LEC at 2 reads the WATS number and signals the LDC at 3, requesting a POTS number. The LDC at 3 accesses its own NCP that contains the invention's database that corresponds to the ANI and the WATS number. The LDC signals the LEC at 2 with the appropriate POTS number, in this case 212-987-6542. The LEC then direct-connects the caller at 1 with the Department of Streets office at 4.

The present invention can also be used in conjunction with demographic boundaries. A system has already been developed by the invention, tested and implemented for NPA-NXX-XXXX assignment within boundaries assigned that did not follow geopolitical boundaries. An advertiser wished to divide the United States into 1,000 "response zones", each having a population of 90,000 residents. By employing the location counts, and determining the population per household for each given area, the invention was able to successfully carry out the task. The invention can be reliably employed for any demographic data, since that data will always correlate to a type of geographic area.

Referring now to FIG. 4 which illustrates the application of the invention by ZIP code boundaries, a regional post office that oversees the operation of several local post offices wishes to utilize the invention by providing to citizens the telephone number 1-800-EXPRESS. The number will be used to promote a new service the Post Office is implementing. This new service is free pickup from the sending party of any letter or parcel being sent by EXPRESS mail. The regional post office wishes to use one single telephone number for this service. Citizens will be direct-connected to the Central Post Office in their area. Each Central Post Office has a territory that encompasses several ZIP codes. In the case of FIG. FIG. 4, the Central Post Office is responsible for pickups in ZIP codes 10004, 10005, 10038, 10002, 10009, 10006, 10007, 10280, 10013.

A caller at 1 with the ANI 212-546-4657 dials 1-800-EXPRESS to request EXPRESS mail pickup of a parcel he wishes to send. The LEC at 2 reads the WATS number and signals the LDC at 3, requesting a POTS number. The LDC at 3 accesses its own NCP that contains the invention's database that corresponds to the ANI and the WATS number. The LDC signals the LEC at 2 with the appropriate POTS number, in this case 212-999-8754. The LEC then direct-connects the caller at 1 with the Central Post Office at 4.

Referring now to FIG. 5 which illustrates the application of the invention by MSA boundaries, a national computer dealer that oversees the operation of several regional computer service centers wishes to utilize the invention by providing to customers the telephone number 1-800-DISPLAY. The number will be used to promote a new item the computer dealer is marketing. This new item is a high-performance video display that costs less than the display originally supplied with the computer to the customer. The national computer dealer wishes to use one single telephone number for this service. Customers will be direct-connected to the regional computer service centers in their area. Each regional computer service centers has a territory that encompasses an entire MSA. In the case of FIG. 5, the regional computer service centers is responsible for customers in the New York MSA.

A caller at 1 with the ANI 718-469-4567 dials 1-800-DISPLAY to request information regarding the high-performance video display. The LEC at 2 reads the WATS number and signals the LDC at 3, requesting a POTS number. The LDC at 3 accesses its own NCP that contains the invention's database that corresponds to the ANI and the WATS number. The LDC signals the LEC at 2 with the appropriate POTS number, in this case 914-229-9987. The LEC then direct-connects the caller at 1 with the regional computer service center at 4.

Referring now to FIG. 6 which illustrates the application of the invention by Congressional District boundaries, the New York Congressional Delegation wishes to utilize the invention by providing to constituents the telephone number so 1-800-VOTE4NY. The number will immediately be used to solicit constituents' sentiments regarding pending legislation, and in the future will be maintained as a means of providing constituents with access to their congressional representative. Constituents dialing this number will be immediately connected to the office of the congressional representative in whose territory they reside. The New York Congressional Delegation wishes to use one single telephone number for this service. Constituents will be direct-connected to the respective office. hi the case of FIG. 6, New York Congressional District 15 will be discussed.

A caller at 1 with the ANI 212-846-9456 dials 1-800-VOTE4NY to request information regarding pending legislation. The LEC at 2 reads the WATS number and signals the LDC at 3, requesting a POTS number. The LDC at 3

accesses its own NCP that contains the invention's database that corresponds to the ANI and the WATS number. The LDC signals the LEC at 2 with the appropriate POTS number, in this case 212-242-2999. The LEC then direct-connects the caller at 1 with the Congressional District Office at 4.

Referring now to FIG. 7 which illustrates the application of the invention by ADI boundaries, the American College of Plastic and Cosmetic Surgeons wishes to utilize the invention by providing to patients the telephone number 1-800-9BETTER. The number will be used to provide a "sounding board" to patients who did not receive satisfactory results with their plastic surgery, or those 'who are interested in the qualifications of a surgeon they are contemplating using. Patients dialing this number will be immediately connected to the office of the patient affairs liaison representative in whose territory they reside. The American College of Plastic and Cosmetic Surgeons wishes to use one sample telephone number for this service. Patients will be direct-connected to the respective office. In the case of FIG. 7, complaints handled by the American College of Plastic and Cosmetic Surgeons representative for the New York ADI will be discussed.

A caller at 1 with the ANI 201-284-6945 dials 1-800-9BETTER to request information regarding the surgeon who will do a face-lift. The LEC at 2 reads the WATS number and signals the LDC at 3, requesting a POTS number. The LDC at 3 accesses its own NCP that contains the invention's database that corresponds to the ANI and the WATS number. The LDC signals the LEC at (2) with the appropriate POTS number, in this case 914-422-9899. The LEC then direct-connects the caller at 1 with the Congressional District Office at 4.

The degree of accuracy at the NPA-NXX-XXXX level, with relation to vertical/horizontal coordinates of call origination, increases with every implementation of the system.

When a call is made from individual NPA-NXX-XXXX's, the carrier must, for billing purposes, capture that ANI. In capturing that ANI, it is possible to correlate the actual vertical/horizontal coordinates of that ANI, using third party or in-house data sources. Each time the invention is implemented, a new list of ANI's that responded to the advertisement is created. That listing of the full ANI and its vertical/horizontal coordinates are input into the invention's database as an update or an addendum. The process is one of perpetual update as new telephone numbers, address changes, etc., are created.

Due to the fact that a key or primary field in the database can be the ANI or the vertical/horizontal coordinates of the ANI, the correlational database may be relational or hierarchical. Due to the fact that demographic data is relational to specific geographic areas, the database updates also provide a means to further update demographic data within a given geographic area.

If the data sources for updates are incorporated into the database used for NPA-NXX-XXXX assignment, where 407-123-4567 is known to have a vertical coordinate of "Y" and a horizontal coordinate of "X", replacing an NPA-NXX-XXXX of unknown coordinates, the system becomes self-generating.

The present invention can be used in conjunction with a Geographic Information System (GIS). As defined, a GIS provides visual interpretation of information that can be defined with a vertical and horizontal coordinate system, such as, but not limited to, latitude and longitude.

While it is by no means necessary to employ a GIS while using the invention, FIGS. 3 through 7 illustrate application of the invention with respect to various geographic and demographic criteria as provided with various GIS programs.

When the advertiser requests a certain criteria as the boundary of a designated response zone, that response zone is like a transparent layer to the base map containing the corresponding NPA-NXX-XXXX combinations. Those combinations that fall within the boundaries as determined by the advertiser are automatically assigned to the location within that response zone.

It is not implied that the boundaries outlined above are the only boundaries with which an advertiser may determine territorial definition. As previously described, there are a number of boundaries available. Indeed, the definition of DRZ boundaries is limited only by the ability to obtain or define vertical and horizontal coordinates for points along those lines or polygons drawn by the advertiser.

The present system and the method employed thereby may be best illustrated farther by examining its use in the case of a company that manufactures high-performance audio equipment.

The company manufactures high-performance audio equipment and uses a very select group of retailers to market its products. The retailer group has 1000 locations nationwide, and each has a protected and franchised territory granted from the manufacturer. In some instances, the manufacturer has only one retailer in a given state (Montana, for example), while in other instances it has several retailers in the same city (eight in New York, six in Chicago). There are also markets that the manufacturer has not yet penetrated, and the manufacturer would like to collate data from those markets in order to determine (based on caller response from current advertising) which of those markets should be granted the next franchise.

Employment of the invention in the above-mentioned scenario would be as follows:

1. DATABASE PROCESSING.

A. Obtain and/or build a database that has the following fields with each record:

NPA—area code from which a call originates.

NXX—telephone exchange from which a call originates.

ZIP code

ZIP Code Plus 4

Location Count (how many times does this NPA-NXX occur in this ZIP Code Plus 4)

B. For accuracy assurance, the information for this database, when processed, can be warranted to contain every NPA-NXX in the country, along with every ZIP Code Plus 4 that it occurs in, and how many times it occurs in each ZIP Code Plus 4.

An alternative is to acquire and/or build a database containing NPA-NXX-XXXX (telephone area code—exchange—last four digits), street address and ZIP code. Cross references are available that match street address to Zip Code Plus 4.

C. Process each NPA-NXX combination throughout the country to determine where that NPA-NXX is predominant within the area that it exists (an alternative is to identify geographic location of the full NPA-NXX-XXXX). Individual NPA-NXX's have service areas that often cross geopolitical boundaries, such as city limits, ZIP code Boundaries, county lines, etc. There are two boundaries that an NPA-NXX does not cross, and those boundaries are the limits of the NPA and the NPA-NXX will not cross state borders. This processing requires a number of sub-routines:

(1). Determine the percentage by Zip Code Plus 4 for each NPA-NXX. The question is to determine which

ZIP Code Plus 4 is the one in which this NPA-NXX is most predominant.

FIG. 8 shows NPA-NXX 212–239 occurring in four ZIP codes. For simplicity, I will examine those two ZIP codes in which it is most predominant.

Within ZIP code 10017, there are 7 ZIP Code Plus 4's that it occurs in, with the highest predominance in 10017-3687 (3471 locations, 52.73% of the locations for 212–239 within ZIP code 10017)

Within ZIP code 10018, there are 6 ZIP Code Plus 4's that it occurs in, with the highest predominance in 10018-2687 (523 locations, 30.62% of the locations for 212–239 within ZIP code 10018).

If it were necessary to assign NPA-NXX's within this area by ZIP Code Plus 4 predominance, 212–239 would be assigned to the location getting ZIP Code Plus 4 10017-3687. This action is often necessary for advertisers who define territories within major metropolitan markets by street boundaries, due to the fact ZIP Code Plus 4 numbers are defined by block sections of streets.

If it were necessary to assign this NPA-NXX by ZIP code, it is obvious that this NPA-NXX would be assigned to the location within ZIP code 10017.

Any other criteria for assigning an NPA-NXX can be derived from either of these two techniques, or combinations thereof. Processing of the database continues until each and every NPA-NXX to ZIP Code Plus 4 combination has been analyzed.

(2). Validate data to ensure every ZIP code and ZIP Code Plus 4 has at least one predominant exchange assigned to it. FIG. 9 shows the database of FIG. 8 after completion of initial processing.

2. DETERMINING GEOGRAPHIC LOCATIONS.

Assign a vertical and horizontal coordinate (such as, but not necessarily, latitude and longitude) to each predominant NPA-NXX, or to each NPA-NXX-XXXX.

Determine, for each location where the advertiser wishes calls to be received, the boundary of the recipient's Desired Response Zone (DRZ).

Assign, using the same coordinate system as described hereinabove, vertical and horizontal coordinates to each point along the boundary of the DRZ.

3. ASSIGN NPA-NXX-XXXX'S TO DIRECT-ROUTE.

A. Determine which NPA-NXX's have predominance within the boundary of the DRZ, or the NPA-NXX-XXXX's that exist within that boundary.

B. Assign the recipient's downline to the NPA-NXX-XXXX's of 3A.

C. Repeat steps 3A and 3B until all recipient locations have been assigned.

4. ASSIGN DEFAULT LOCATIONS.

Assign those NPA-NXX-XXXX's not assigned in 3A through 3B to one or more default downlines, at the advertiser's discretion and direction.

The advertiser may wish for calls from all non-assigned areas to be directly routed to a corporate headquarters. The advertiser may wish, for example that calls coming from non-assigned areas in the Pacific, Mountain, Central and Eastern Time Zones go to the regional offices in San Francisco, Denver, Dallas, and Atlanta, respectively. For instance, New York City could be broken up into two (2) areas: New York Location 1—That area of Manhattan that is south of Interstate 495; and New York Location 2—That area Manhattan that is north of Interstate 495.

As previously described, the database has been processed to determine which NPA-NXX-XXXX combinations are predominant within each location's trade area. No previous systems have been able to determine where an NPA-NXX lies within a ZIP code, or by street boundaries. While an individual NPA-NXX may cross either side of Interstate 495 in New York, ZIP Code Plus 4 processing tells us that, for example, 85% of the NPA-NXX exists on north side of the Interstate, hence it assigned to New York Location 2.

It is anticipated that, as the number of telephones within a given NPA-NXX increases towards the limit of 10,000 (XXXX numbers of 0000–9999), the size of the geographic area that the NPA-NXX covers will decrease. This continued localization of NPA-NXX's will be of further assistance to the invention as time passes, and will aid in the identification of NPA-NXX-XXXX combinations that exist in a given territory.

Likewise, while an individual NPA-NXX may cross the border between San Luis Obispo and Monterey Counties, there cannot be a majority in both counties. As such, the NPA-NXX is assigned to the county in which it appears most predominant. With the alternate method, the ZIP Code Plus 4 determines the county in which the call resides.

If the boundary of a ZIP code in which an NPA-NXX is predominant is not co-linear with the boundary of the county (approximately 1% of more than 40,000 ZIP codes), the NPA-NXX is assigned by ZIP Code Plus 4, determining where in the ZIP code it is predominant(or where the NPA-NXX-XXXX is geographically located), and therefore the county in which it is predominant.

The invention is limited to the degree of sophistication of the LDC or carrier. For most LDC's currently operating, the LDC can only direct route by the NPA-NXX identification of the ANI. A system has been developed, implemented and proven that instructs the LDC to direct route a call based on full 10-digit ANI, i.e., NPA-NXX-XXXX is direct routed to Location A, NPA-NXX-XXXY is direct routed to Location B. Application for this variation would be based on known NPA-NXX-XXXX to address relationships.

After defining the trade areas, assigning the corresponding NPA-NXX (or NPA-NXX-XXXX) combinations and submitting the appropriate direct routing information to the chosen LDC, the system (network) is activated.

5. SUBMIT DIRECT ROUTING INFORMATION TO LDC OR TELEPHONE CARRIER.

A. Determine which LDC or telephone carrier to use for direct routing.

B. Ascertain in what type of format LDC or telephone carrier wishes to receive routing information.

C. Prepare NPA-NXX-XXXX and downline information in desired format of LDC or telephone carrier.

D. Submit direct routing instructions to LDC or telephone carrier.

E. LDC or telephone carrier activates downlines for advertiser. All usual and customary reporting features available from LDC or telephone carrier to advertiser.

F. Submit additional direct routing instructions to LDC or telephone carrier as requested by advertiser.

Thus, as described hereinabove, the present invention provides a novel and non-obvious method for direct routing of calls to the nearest or best location of a second party who provides goods, services or information without the need for intervention in accordance with criteria established by the second party.

While some preferred embodiments of the present invention have been described in detail hereinabove, all modifications within the scope or equivalent's of the claims are covered by this invention.

I claim:

1. A system for direct routing a telephone call from a first party who has an originating telephone number at a specific location defined by latitude and longitude coordinates who dials a telephone number including digits uniquely characteristic to a second party having a plurality of service locations, said system comprising:

means for allocating individual latitude and longitude coordinates to each originating telephone number of all potential first parties;

means for defining the boundaries of one or more geographical areas which can be of any size and shape according to predetermined criteria, each point along said boundaries being defined by latitude and longitude coordinates;

means for assigning to each originating telephone number of said potential first parties a telephone number of a service location of a second party that will receive calls originating from within the boundary of a geographic area defined by said means for defining in which the individual latitude and longitude coordinates of the specific location of each of said potential first parties lie;

means for determining the originating telephone number of the first party from which said telephone call is to be routed; and

direct routing means for direct routing said telephone call to a service location of the second party assigned to said originating telephone number of the first party by said means for assigning.

2. The system of claim 1 wherein said means for allocating, defining and assigning are comprised by a database.

3. The system of claim 2 wherein said database resides at a long distance telephone service provider.

4. The system of claim 3 wherein said long distance telephone service provider has equipment capable of accommodating 800-type telephone traffic.

5. The system of claim 4 wherein said telephone number including digits uniquely characteristic to the second party is an 800-type telephone number.

6. The system of claim 1 wherein said predetermined criteria is defined by the second party.

7. The system of claim 1 wherein the latitude and longitude coordinates of the specific location of the first party define the street address of the first party.

8. The system of claim 1 wherein said telephone number including digits uniquely characteristic to the second party comprises one of an 800, 900 or special access code telephone number.

9. A method for direct routing a telephone call from a first party who has an originating telephone number at a specific location defined by latitude and longitude coordinates who dials a telephone number including digits uniquely characteristic to a second party having a plurality of service locations, said method comprising the steps of:

allocating individual latitude and longitude coordinates to each originating telephone number of all potential first parties;

defining the boundaries of one or more geographical areas which can be of any size and shape according to predetermined criteria, each point along said boundaries being defined by latitude and longitude coordinates;

assigning to each originating telephone number of said potential first [panics] *parties* of a service parties location of a second party that receive calls originating from within the boundary of a geographic area defined in said step of defining in which the individual latitude and longitude coordinates of the specific location of each of said potential first parties lie;

determining the originating telephone number of the first party from which said telephone call is to be routed; and

directly routing said telephone call to a service location of the second party assigned to said originating telephone number of the first party by said step of assigning.

10. The method of claim 9 wherein said steps of allocating, defining and assigning are performed in a database.

11. The method of claim 10 wherein said database resides at a long distance telephone service provider.

12. The method of claim 11 wherein said long distance telephone service provider has equipment capable of accommodating 800-type telephone traffic.

13. The method of claim 12 wherein said telephone number including digits uniquely characteristic to the second party is an 800-type telephone number.

14. The method of claim 9 wherein said predetermined criteria is defined by the second party.

15. The method of claim 9 wherein the latitude and longitude coordinates of the specific location of the first party define the street address of the first party.

16. The method of claim 9 wherein said telephone number including digits uniquely characteristic to the second party comprises one of an 800, 900 or special access code telephone number.

17. A system for direct routing a telephone call from a first party who has an originating telephone number at a physical location and who dials a telephone number including digits uniquely characteristic to a second party having a plurality of service locations, said system comprising:

means for allocating latitude and longitude coordinates to the physical location of all potential first parties;

means for defining the boundaries of one or more geographical areas which can be of any size and shape according to predetermined criteria, each point along said boundaries being defined by latitude and longitude coordinates;

means for assigning to the physical location of said potential first parties a telephone number of a service location of a second party that will receive calls originating from within the boundary of a geographic area in which the latitude and longitude coordinates of the physical location of each of said potential first parties lie;

means for determining the originating telephone number of the first party from which said telephone call is to be routed; and

direct routing means for directly routing said telephone call to a service location of the second party assigned to said originating telephone number of the first party by said means for assigning.

18. The system of claim 17 wherein the physical location is defined by a street address.

19. The system of claim 17 wherein the physical location is defined by a ZIP+4 code.

20. The system of claim 17 wherein the physical location is defined by a ZIP code.

21. The system of claim 17 wherein the physical location is defined by a city.

22. The system of claim 17, 18, 19, 20 or 21 wherein said one or more geographical areas is defined by a ZIP code.

23. The system of claim 17, 18, 19, 20 or 21 wherein said one or more geographical areas is defined by a plurality of highways.

24. The system of claim 17, 18, 19, 20 or 21 wherein said one or more geographical areas is defined by a designated response zone.

25. The system of claim 17, 18, 19, 20 or 21 wherein said one or more geographical areas is defined by a metropolitan statistical area.

26. The system of claim 17, 18, 19, 20 or 21 wherein said one or more geographical areas is defined by a congressional district.

27. The system of claim 17, 18, 19, 20 or 21 wherein said one or more geographical areas is defined by an area of demographic influence.

28. The system of claim 17 wherein the originating telephone number is that of a non-stationary telephone, such as a mobile, cellular or transportable telephone.

29. A method for direct routing a telephone call from a first party who has an originating telephone number at a physical location and who dials a telephone number including digits uniquely characteristic to a second party having a plurality of service locations, said method comprising the steps of:

allocating latitude and longitude coordinates to the physical location of all potential first parties;

defining the boundaries of one or more geographical areas which can be of any size and shape according to predetermined criteria, each point along said boundaries being defined by latitude and longitude coordinates;

assigning to the physical location of said potential first parties a telephone number of a service location of a second party that will receive calls originating from within the boundary of a geographic area in which the latitude and longitude coordinates of the physical location of each of said potential first parties lie;

determining the originating telephone number of the first party from which said telephone call is to be routed; and

directly routing said telephone call to a service location of the second party assigned to said originating telephone number of the first party by said step of assigning.

30. The method of claim 29 wherein the physical location is defined by a street address.

31. The method of claim 29 wherein the physical location is defined by a ZIP+4 code.

32. The method of claim 29 wherein the physical location is defined by a ZIP code.

33. The method of claim 29 wherein the physical location is defined by a city.

34. The method of claim 29, 30, 31, 32 or 33 wherein said one or more geographical areas is defined by a ZIP code.

35. The method of claim 29, 30, 31, 32 or 33 wherein said one or more geographical areas is defined by a plurality of highways.

36. The method of claim 29, 30, 31, 32 or 33 wherein said one or more geographical areas is defined by a designated response zone.

37. The method of claim 29, 30, 31, 32 or 33 wherein said one or more geographical areas is defined by a metropolitan statistical area.

38. The method of claim 29, 30, 31, 32 or 33 wherein said one or more geographical areas is defined by a congressional district.

39. The method of claim 29, 30, 31, 32 or 33 wherein said one or more geographical areas is defined by an area of demographic influence.

40. The method of claim 29 wherein the originating telephone number is non-stationary telephone, such as a mobile, cellular or transportable telephone.

41. A method of constructing a database wherein said database is used by a telephone service provider for direct routing a telephone call from a first party who has an originating telephone number at a physical location and who dials one of an 800-type, 900-type or other special access code telephone number assigned to a second party, who has determined specific locations to receive calls originating from within pre-determined geographic areas, thereby allowing the first party to reach one of a plurality of locations of the second party based on geographic location from which the telephone call originate from within one of a plurality of geographic areas, said method comprising the steps of:

(a) assigning individual latitude and longitude coordinates to the physical location of all potential first parties;

(b) defining the boundaries of one or more geographic areas which can be of any size and shape according to predetermined criteria each point along said boundaries being defined by latitude and longitude coordinates; and

(c) assigning to the physical location of said potential first parties a telephone number of a service location of a second party that will receive calls originating from within the boundary of a geographic territory in which the latitude and longitude coordinates of the physical location of each of said potential first parties lies.

42. The method of claim 41 wherein step (a) comprises the steps of:

(i) determining a street address of the physical location of each potential first party;

(ii) determining the latitude and longitude coordinates of the street address of each potential first party; and

(iii) correlating the latitude and longitude coordinates of each street address to the telephone number of each potential first party.

43. The method of claim 41 wherein step (a) comprises the steps of:

(i) determining a ZIP+4 code of the physical location of each potential first party;

(ii) determining the latitude and longitude coordinates of said ZIP+4 code; and

(iii) correlating the latitude and longitude coordinates of each ZIP+4 code to the telephone number of each potential first party.

44. The method of claim 41 wherein step (a) comprises the steps of:

(i) determining a ZIP code of the physical location of each potential first party;

(ii) determining the latitude and longitude coordinates of the ZIP code of each potential first party; and

(iii) correlating the latitude and longitude coordinates of each ZIP code to the telephone number of each potential first party.

45. The method of claim 41 wherein step (a) comprises the steps of:

(i) determining a city of the physical location of each potential first party;

(ii) determining the latitude and longitude coordinates of the city of each potential first party; and

(iii) correlating the latitude and longitude coordinates of each city to the telephone number of each potential first party.

46. The method of claim 41, 42, 43, 44 or 45 wherein said one or more geographical areas is defined by a ZIP code.

47. The method of claim 41, 42, 43, 44 or 45 wherein said one or more geographical areas is defined by a plurality of highways.

48. The method of claim 41, 42, 43, 44 or 45 wherein said one or more geographical areas is defined by a designated response zone.

49. The method of claim 41, 42, 43, 44 or 45 wherein said one or more geographical areas is defined by a metropolitan statistical area.

50. The method of claim 41, 42, 43, 44 or 45 wherein said one or more geographical areas is defined by a congressional district.

51. The method of claim 41, 42, 43, 44 or 45 wherein said one or more geographical areas is defined by an area of demographic influence.

52. The method of claim 41 wherein the originating telephone number is non-stationary telephone, such as a mobile, cellular or transportable telephone.

* * * * *

US005506897A

United States Patent [19]

Moore et al.

[11] Patent Number: 5,506,897

[45] Date of Patent: Apr. 9, 1996

[54] **AUTOMATIC ROUTING SYSTEM FOR TELEPHONIC SERVICES**

[75] Inventors: **George G. Moore**; **James D. Shaffer**, both of Rancho Santa Fe, Calif.

[73] Assignee: **Murex Securities, Ltd.**, New Providence, Bahamas

[21] Appl. No.: **365,325**

[22] Filed: **Dec. 28, 1994**

Related U.S. Application Data

[63] Continuation of Ser. No. 20,653, Feb. 22, 1993, abandoned.

[51] **Int. Cl.**[6] **H04M 3/42**

[52] **U.S. Cl.** **379/220**; 379/127; 379/201; 379/211

[58] **Field of Search** 379/220, 142, 379/127, 201, 202, 207, 265, 211, 221, 230; 370/62

[56] **References Cited**

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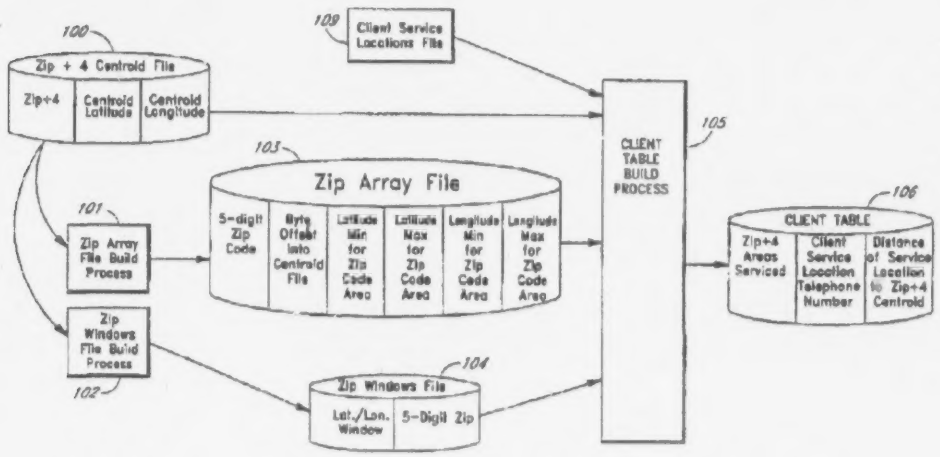
"Topological Integrated Geographic Encoding and Referencing System/Zone Improvement Plan," Oct. 1991, pp. 3–5.

Primary Examiner—Jeffery Hofsass
Assistant Examiner—Scott Wolinsky
Attorney, Agent, or Firm—Knobbe, Martens, Olson & Bear

[57] **ABSTRACT**

A system and method for automatically and seamlessly routing telephone calls across a telephone network. The system includes a telephone switch having a computer, a master file and client file stored in the computer, in which the master file is dynamically linked with the client file at routing time to produce a selected client telephone number which is transmitted across the telephone network. The system utilizes Automatic Number Identification to identify the calling party. The master file has a plurality of records having a telephone number field and a spatial key field and is updated frequently. The client file has a plurality of records having a spatial key field and a client telephone number. Methods of generating the client files for three client service area definitions are included in the present invention.

84 Claims, 25 Drawing Sheets



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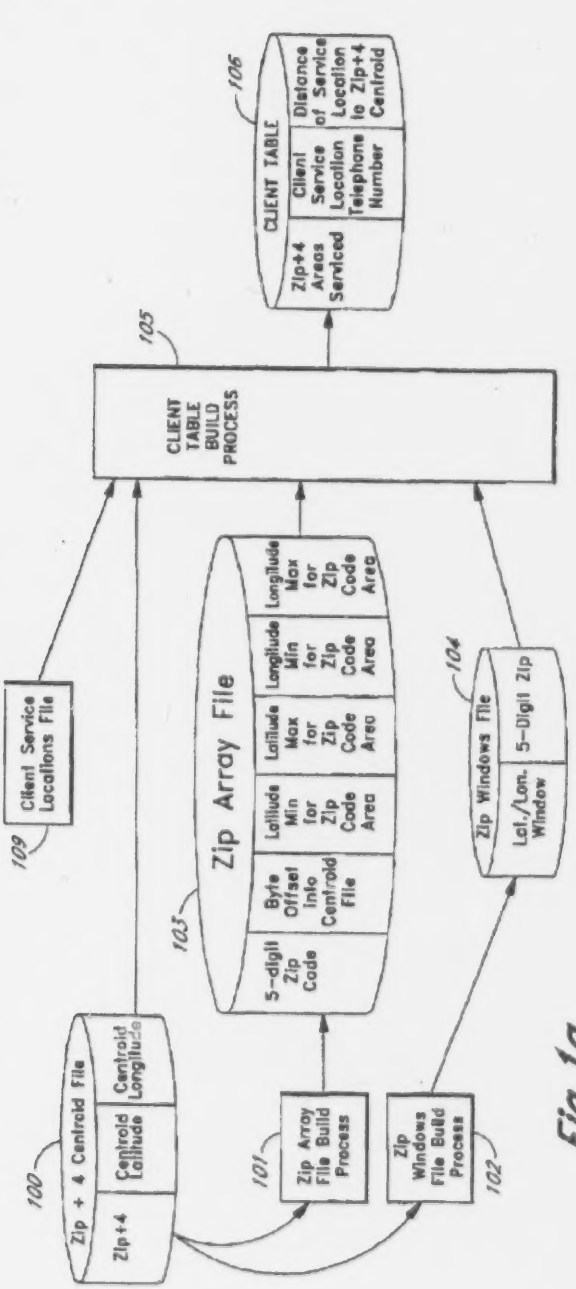

Fig. 1a

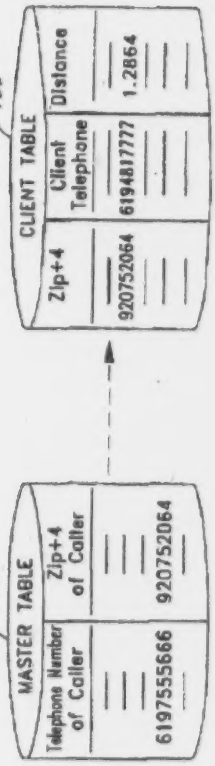

Fig. 1b

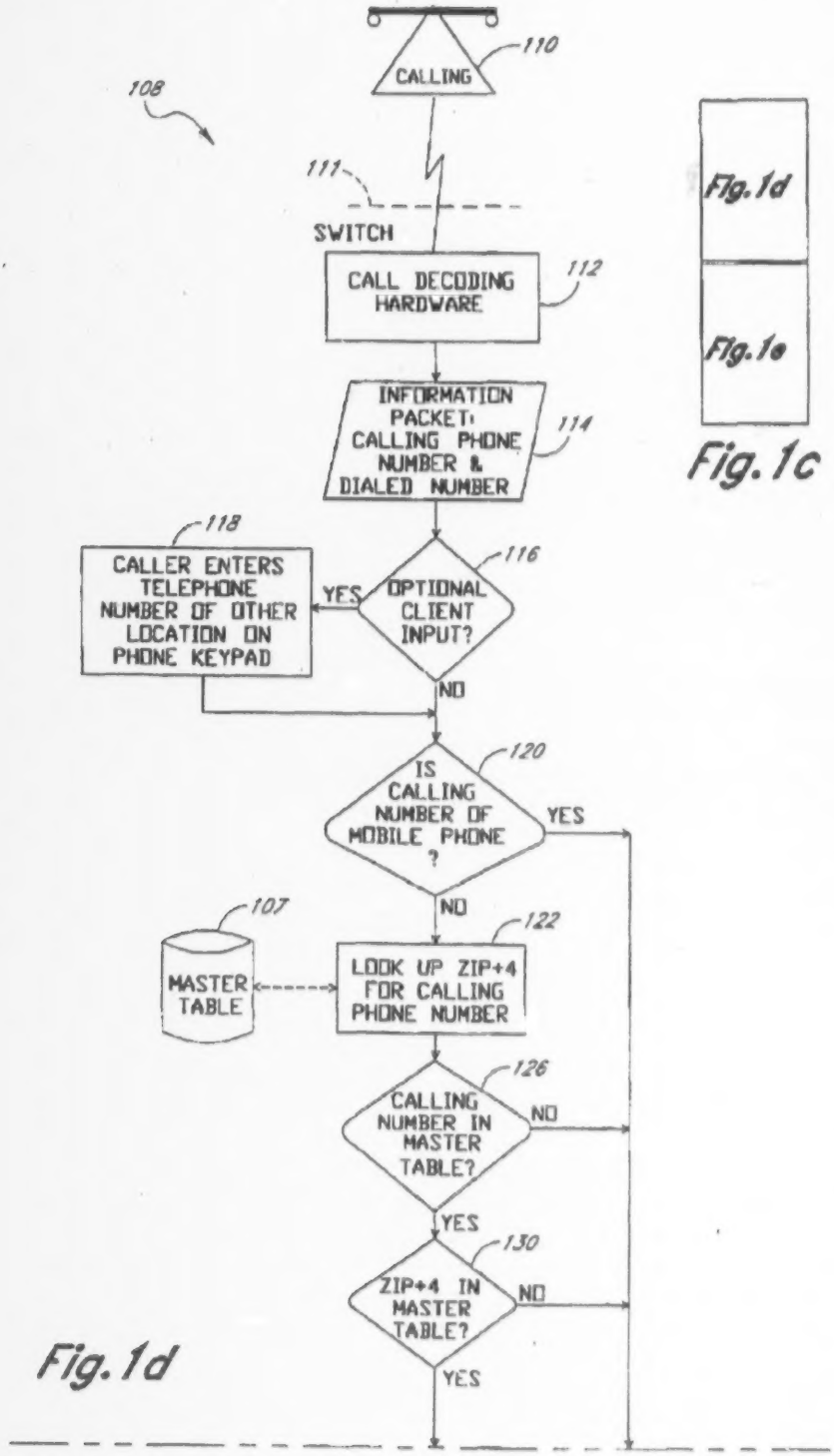

Fig. 1d

Fig. 1d

Fig. 1e

Fig. 1c

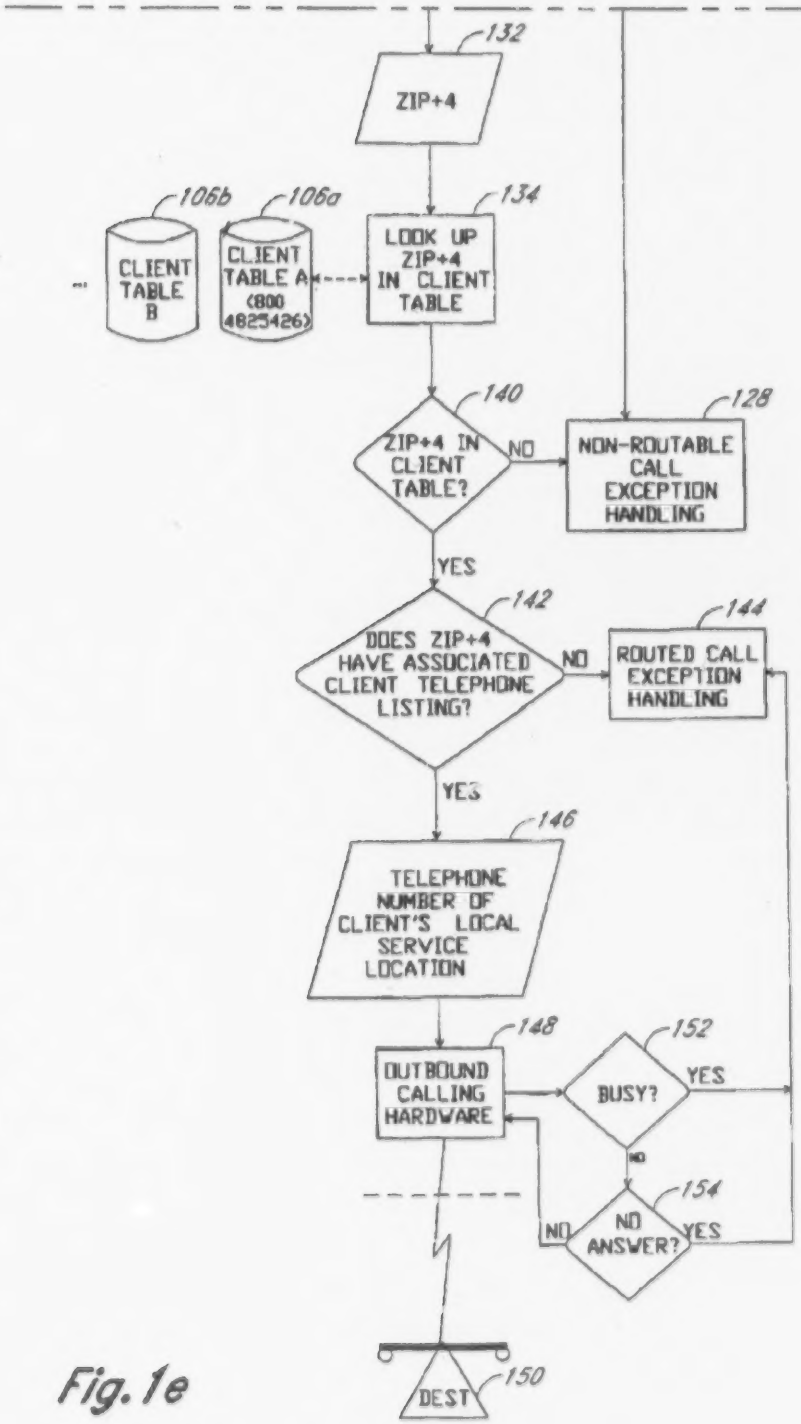
132
ZIP+4
106b
106a
134
CLIENT TABLE B
CLIENT TABLE A (800 4825426)
LOOK UP ZIP+4 IN CLIENT TABLE
140
128
ZIP+4 IN CLIENT TABLE?
NO
NON-ROUTABLE CALL EXCEPTION HANDLING
YES
142
144
DOES ZIP+4 HAVE ASSOCIATED CLIENT TELEPHONE LISTING?
NO
ROUTED CALL EXCEPTION HANDLING
YES
146
TELEPHONE NUMBER OF CLIENT'S LOCAL SERVICE LOCATION
148
152
OUTBOUND CALLING HARDWARE
BUSY?
YES
NO
154
NO ANSWER?
NO
YES
DEST
150

Fig. 1e

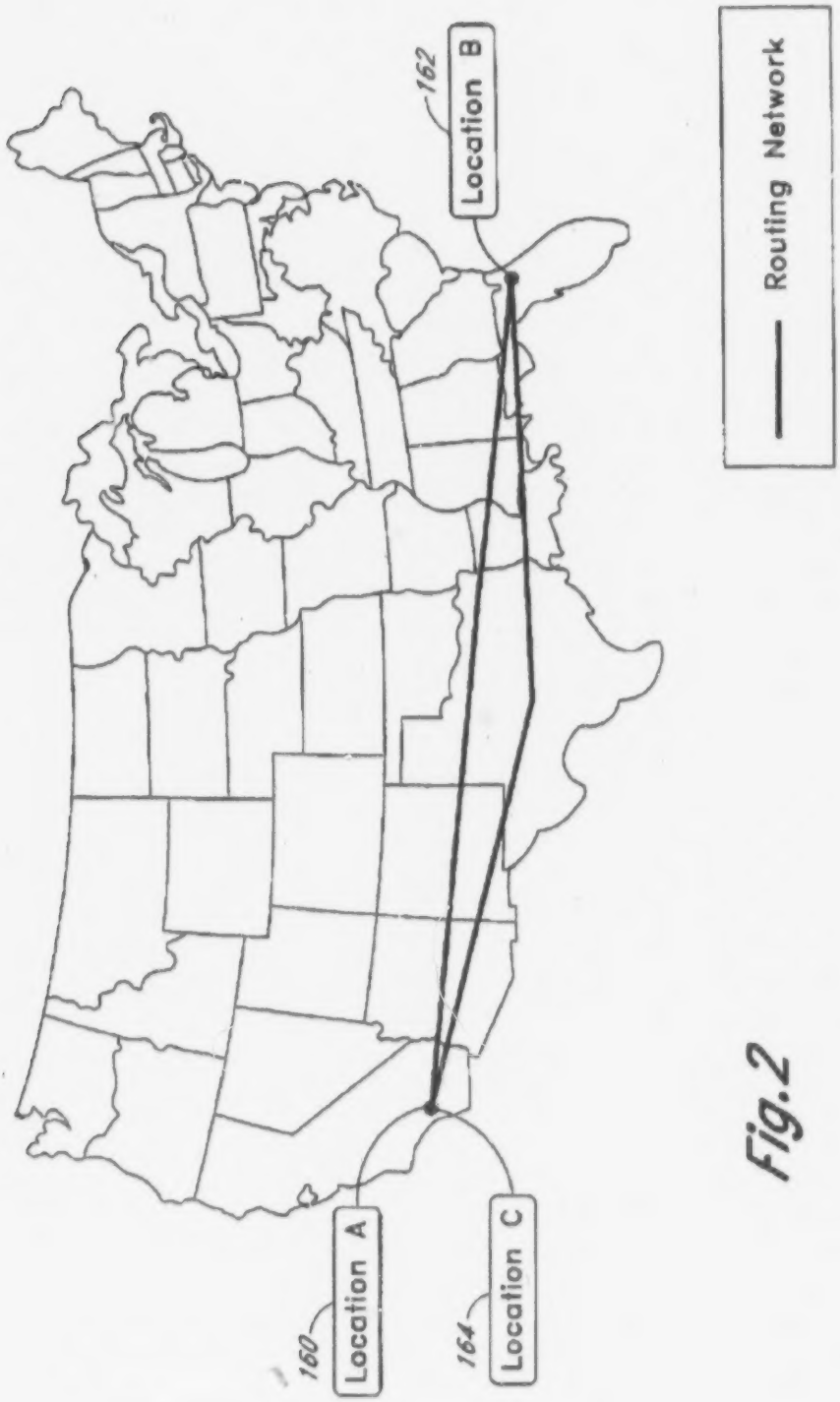
Routing Network
Location B
162
Location A
160
Location C
164

Fig. 2

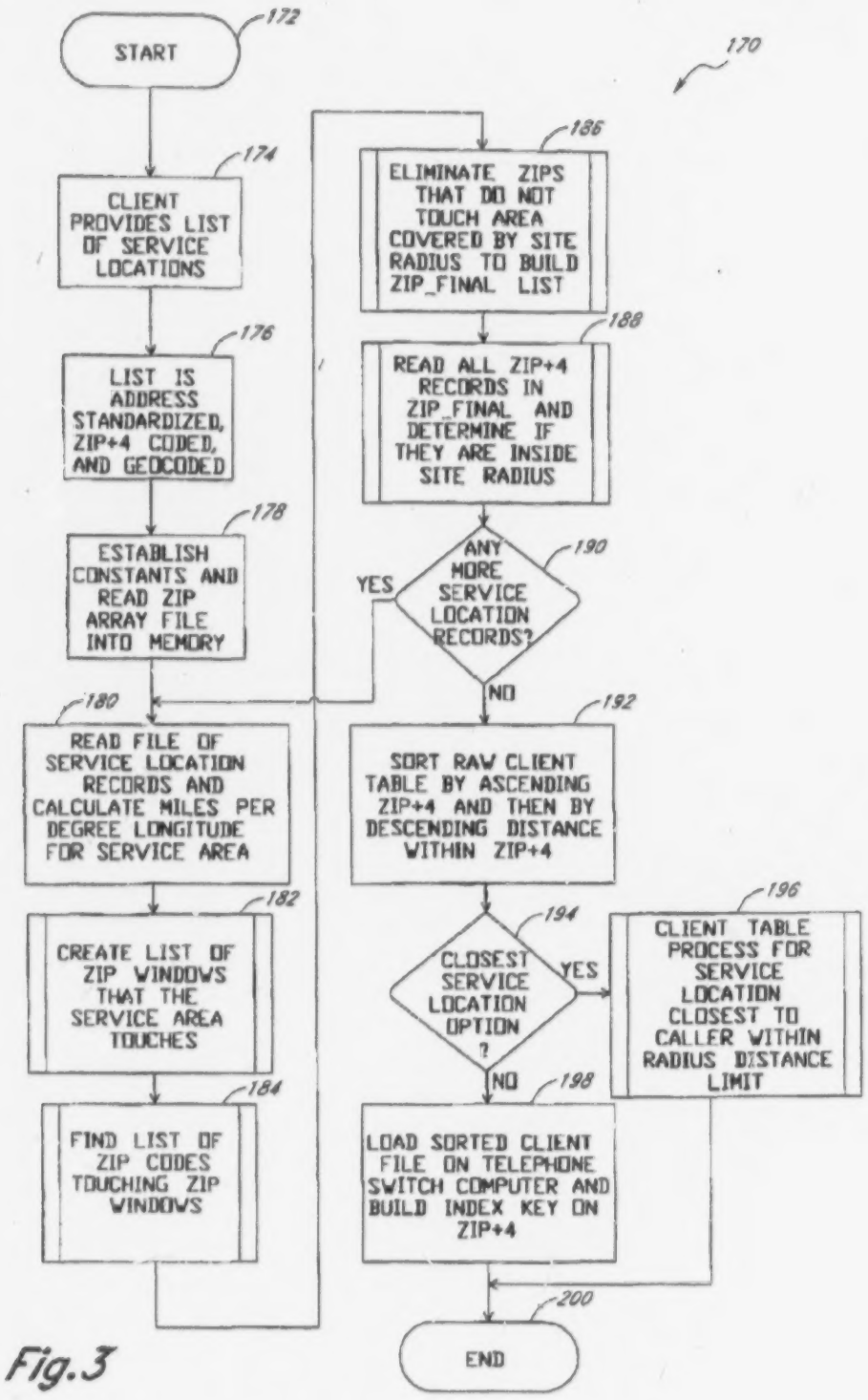
START
172
170
CLIENT PROVIDES LIST OF SERVICE LOCATIONS
174
LIST IS ADDRESS STANDARDIZED, ZIP+4 CODED, AND GEOCODED
176
ESTABLISH CONSTANTS AND READ ZIP ARRAY FILE INTO MEMORY
178
READ FILE OF SERVICE LOCATION RECORDS AND CALCULATE MILES PER DEGREE LONGITUDE FOR SERVICE AREA
180
CREATE LIST OF ZIP WINDOWS THAT THE SERVICE AREA TOUCHES
182
FIND LIST OF ZIP CODES TOUCHING ZIP WINDOWS
184
ELIMINATE ZIPS THAT DO NOT TOUCH AREA COVERED BY SITE RADIUS TO BUILD ZIP_FINAL LIST
186
READ ALL ZIP+4 RECORDS IN ZIP_FINAL AND DETERMINE IF THEY ARE INSIDE SITE RADIUS
188
ANY MORE SERVICE LOCATION RECORDS?
190
YES
NO
SORT RAW CLIENT TABLE BY ASCENDING ZIP+4 AND THEN BY DESCENDING DISTANCE WITHIN ZIP+4
192
CLOSEST SERVICE LOCATION OPTION ?
194
YES
NO
CLIENT TABLE PROCESS FOR SERVICE LOCATION CLOSEST TO CALLER WITHIN RADIUS DISTANCE LIMIT
196
LOAD SORTED CLIENT FILE ON TELEPHONE SWITCH COMPUTER AND BUILD INDEX KEY ON ZIP+4
198
END
200

Fig. 3

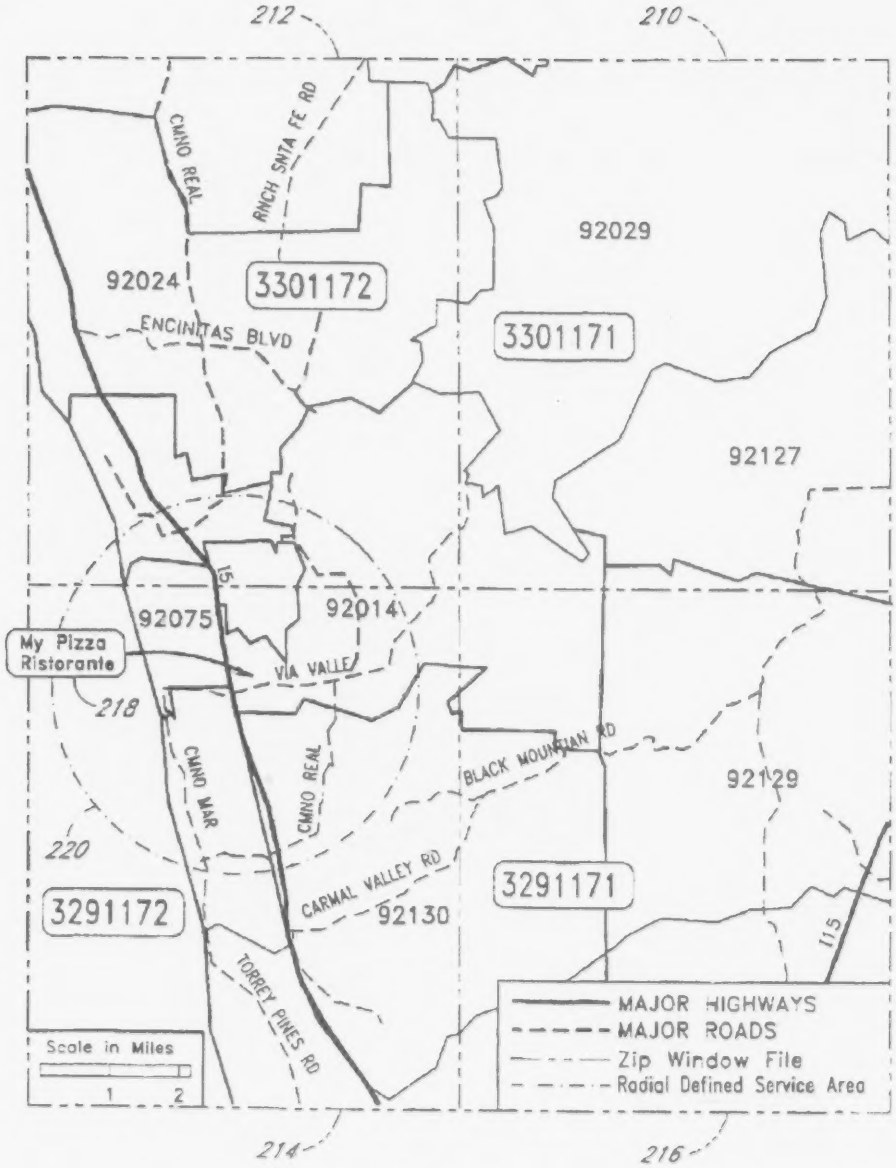
212
210
CMNO REAL
RNCH SNTA FE RD
92024
3301172
92029
ENCINITAS BLVD
3301171
92127
15
92075
92014
My Pizza Ristorante
VIA VALLE
218
CMNO MAR
CMNO REAL
BLACK MOUNTAIN RD
92129
220
CARMAL VALLEY RD
3291172
92130
3291171
115
TORREY PINES RD
MAJOR HIGHWAYS
MAJOR ROADS
Zip Window File
Radial Defined Service Area
Scale in Miles
1
2
214
216

Fig.4

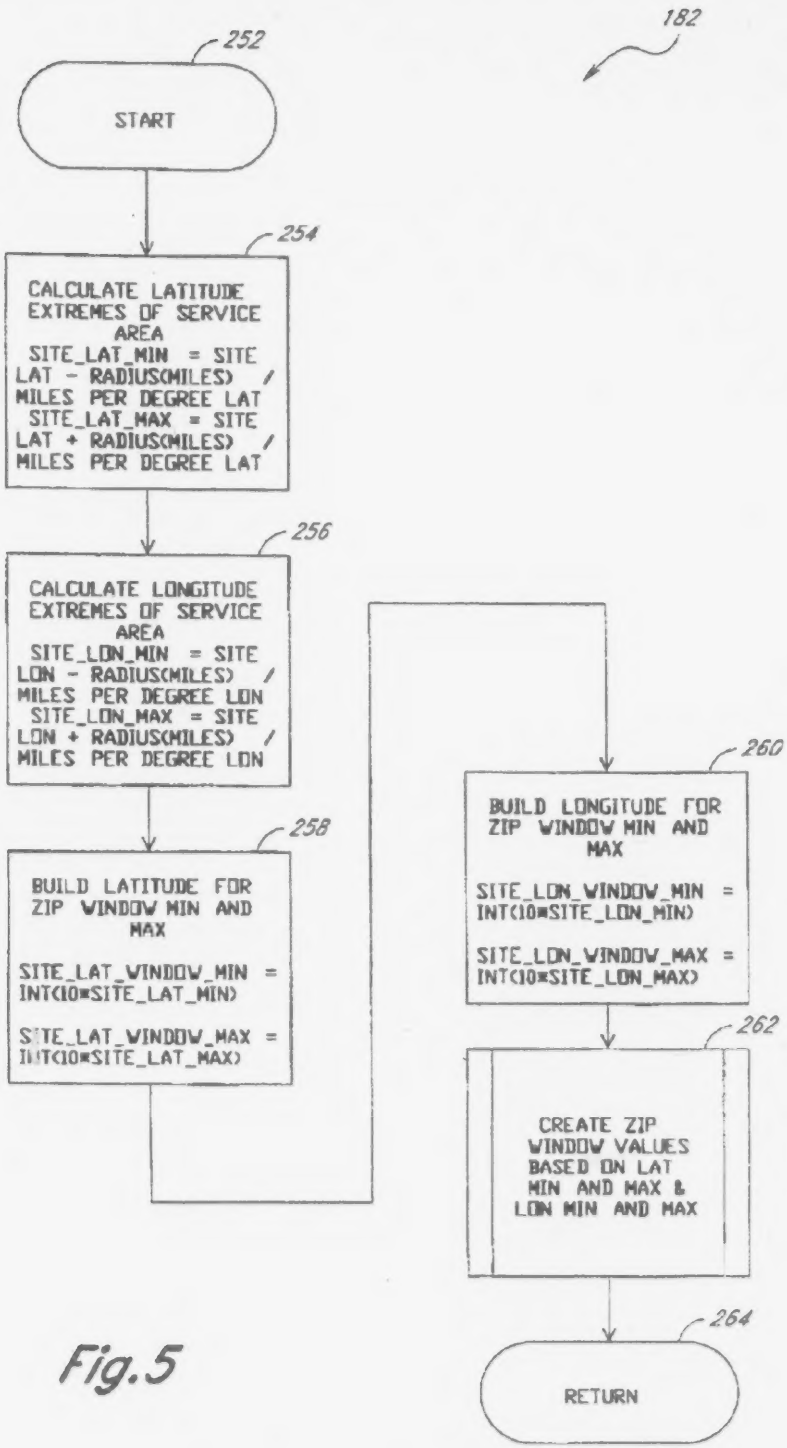
182
252
START
254
CALCULATE LATITUDE EXTREMES OF SERVICE AREA
SITE_LAT_MIN = SITE LAT - RADIUS(MILES) / MILES PER DEGREE LAT
SITE_LAT_MAX = SITE LAT + RADIUS(MILES) / MILES PER DEGREE LAT
256
CALCULATE LONGITUDE EXTREMES OF SERVICE AREA
SITE_LON_MIN = SITE LON - RADIUS(MILES) / MILES PER DEGREE LON
SITE_LON_MAX = SITE LON + RADIUS(MILES) / MILES PER DEGREE LON
258
BUILD LATITUDE FOR ZIP WINDOW MIN AND MAX
SITE_LAT_WINDOW_MIN = INT(10*SITE_LAT_MIN)
SITE_LAT_WINDOW_MAX = INT(10*SITE_LAT_MAX)
260
BUILD LONGITUDE FOR ZIP WINDOW MIN AND MAX
SITE_LON_WINDOW_MIN = INT(10*SITE_LON_MIN)
SITE_LON_WINDOW_MAX = INT(10*SITE_LON_MAX)
262
CREATE ZIP WINDOW VALUES BASED ON LAT MIN AND MAX & LON MIN AND MAX
264
RETURN

Fig.5

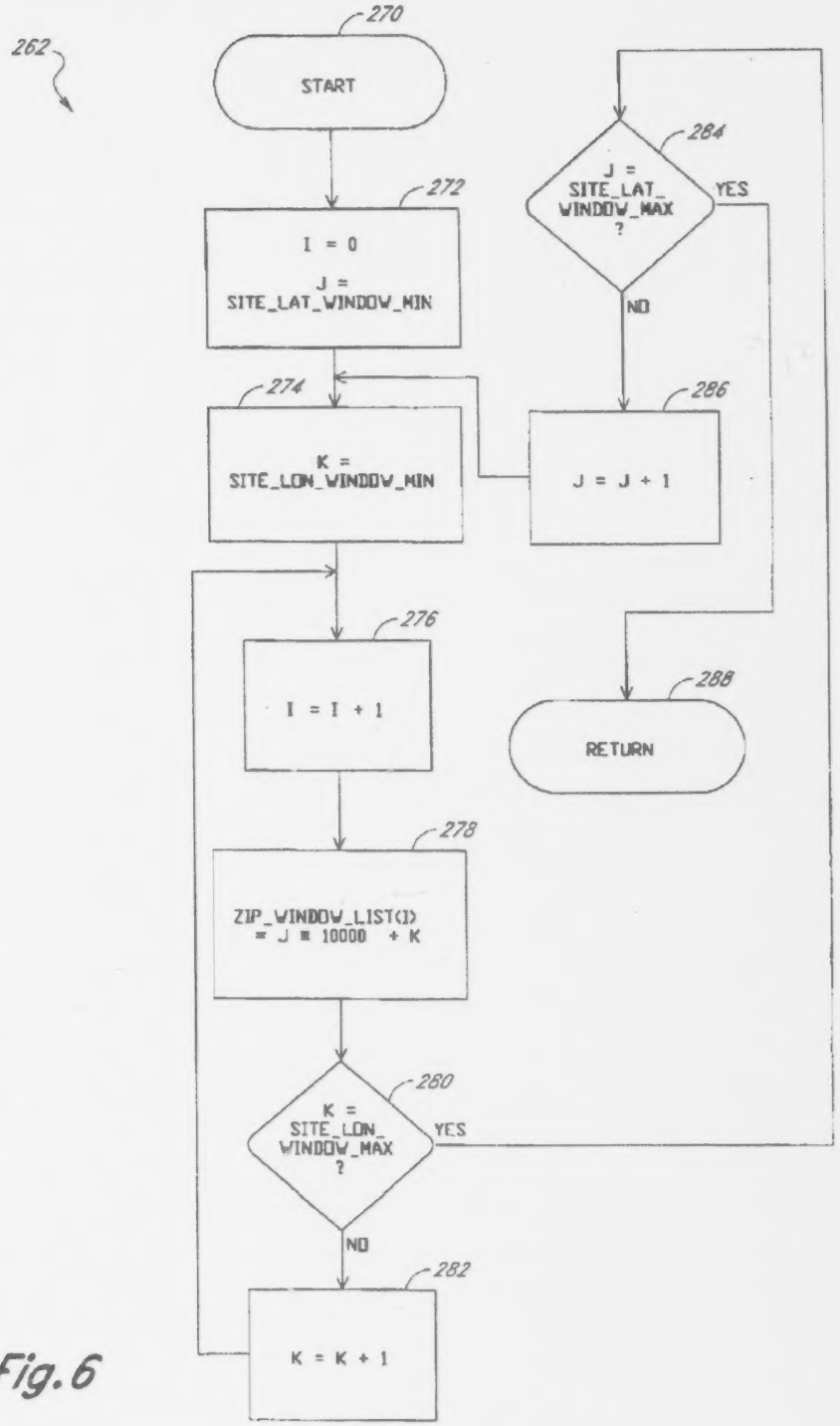
262
270
START
272
I = 0
J = SITE_LAT_WINDOW_MIN
274
K = SITE_LON_WINDOW_MIN
276
I = I + 1
278
ZIP_WINDOW_LIST(I) = J * 10000 + K
280
K = SITE_LON_WINDOW_MAX ?
YES
NO
282
K = K + 1
284
J = SITE_LAT_WINDOW_MAX ?
YES
NO
286
J = J + 1
288
RETURN

Fig. 6

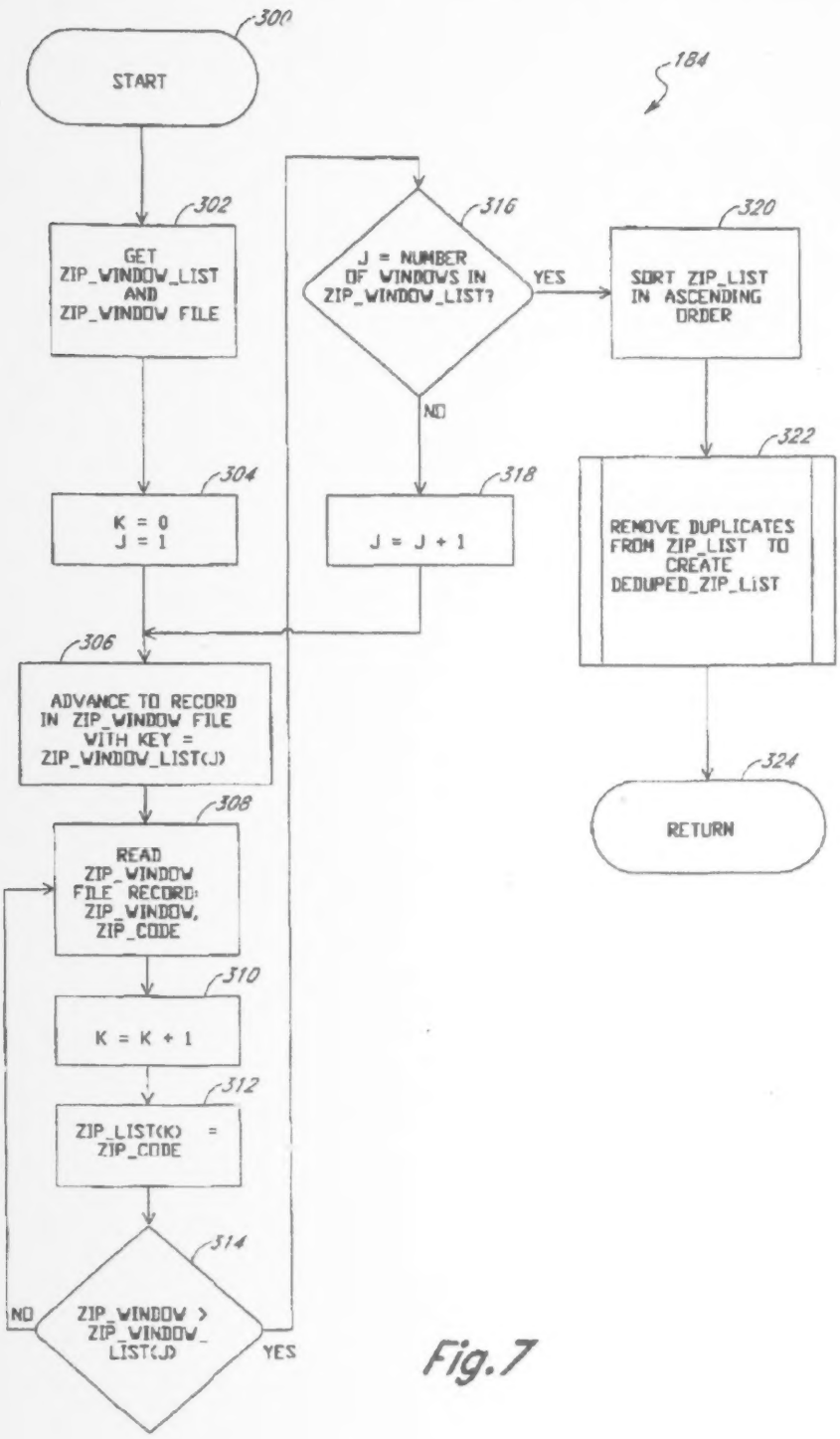
300
START
184
302
GET ZIP_WINDOW_LIST AND ZIP_WINDOW FILE
304
K = 0
J = 1
306
ADVANCE TO RECORD IN ZIP_WINDOW FILE WITH KEY = ZIP_WINDOW_LIST(J)
308
READ ZIP_WINDOW FILE RECORD: ZIP_WINDOW, ZIP_CODE
310
K = K + 1
312
ZIP_LIST(K) = ZIP_CODE
314
ZIP_WINDOW > ZIP_WINDOW_LIST(J)
NO
YES
316
J = NUMBER OF WINDOWS IN ZIP_WINDOW_LIST?
YES
NO
318
J = J + 1
320
SORT ZIP_LIST IN ASCENDING ORDER
322
REMOVE DUPLICATES FROM ZIP_LIST TO CREATE DEDUPED_ZIP_LIST
324
RETURN

Fig. 7

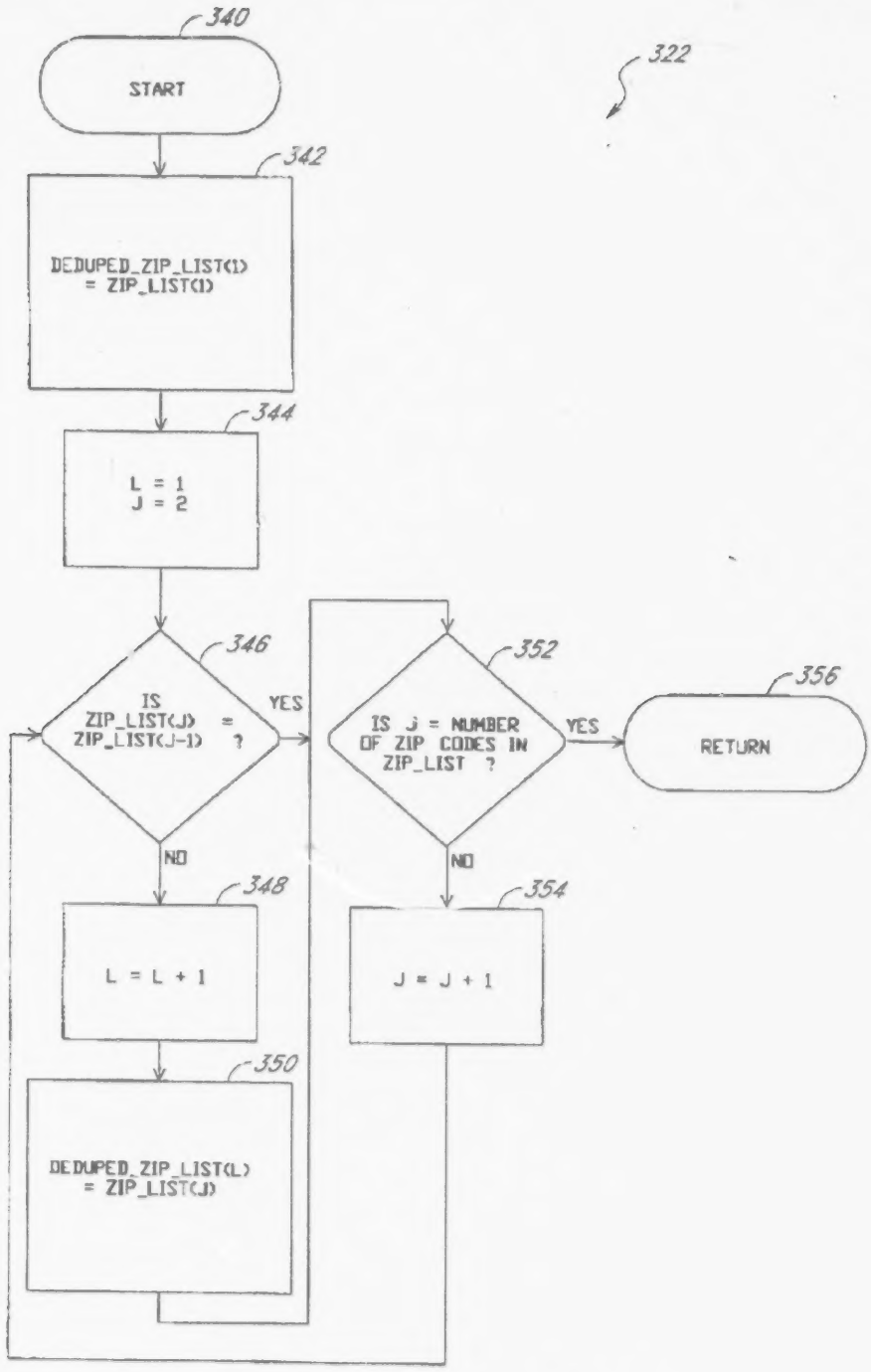
340
START
322
342
DEDUPED_ZIP_LIST(1) = ZIP_LIST(1)
344
L = 1
J = 2
346
IS ZIP_LIST(J) = ZIP_LIST(J-1) ?
YES
NO
352
IS J = NUMBER OF ZIP CODES IN ZIP_LIST ?
YES
NO
356
RETURN
348
L = L + 1
354
J = J + 1
350
DEDUPED_ZIP_LIST(L) = ZIP_LIST(J)

Fig.8

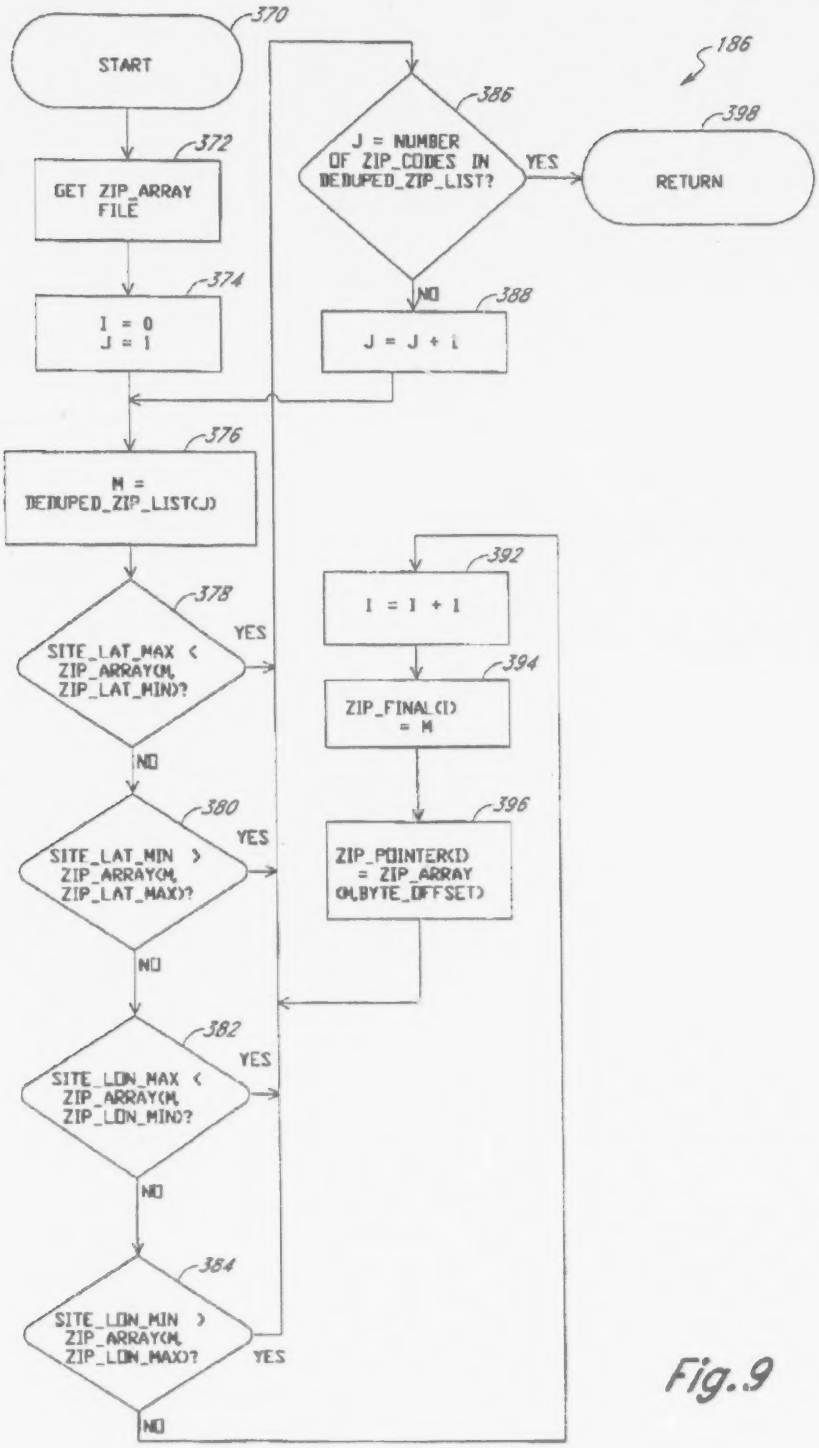
370
START
372
GET ZIP_ARRAY FILE
374
I = 0
J = 1
376
M = DEDUPED_ZIP_LIST(J)
378
SITE_LAT_MAX < ZIP_ARRAY(M, ZIP_LAT_MIN)?
YES
NO
380
SITE_LAT_MIN > ZIP_ARRAY(M, ZIP_LAT_MAX)?
YES
NO
382
SITE_LON_MAX < ZIP_ARRAY(M, ZIP_LON_MIN)?
YES
NO
384
SITE_LON_MIN > ZIP_ARRAY(M, ZIP_LON_MAX)?
YES
NO
386
J = NUMBER OF ZIP_CODES IN DEDUPED_ZIP_LIST?
YES
NO
388
J = J + 1
186
398
RETURN
392
I = I + 1
394
ZIP_FINAL(I) = M
396
ZIP_POINTER(I) = ZIP_ARRAY (M,BYTE_OFFSET)

Fig. 9

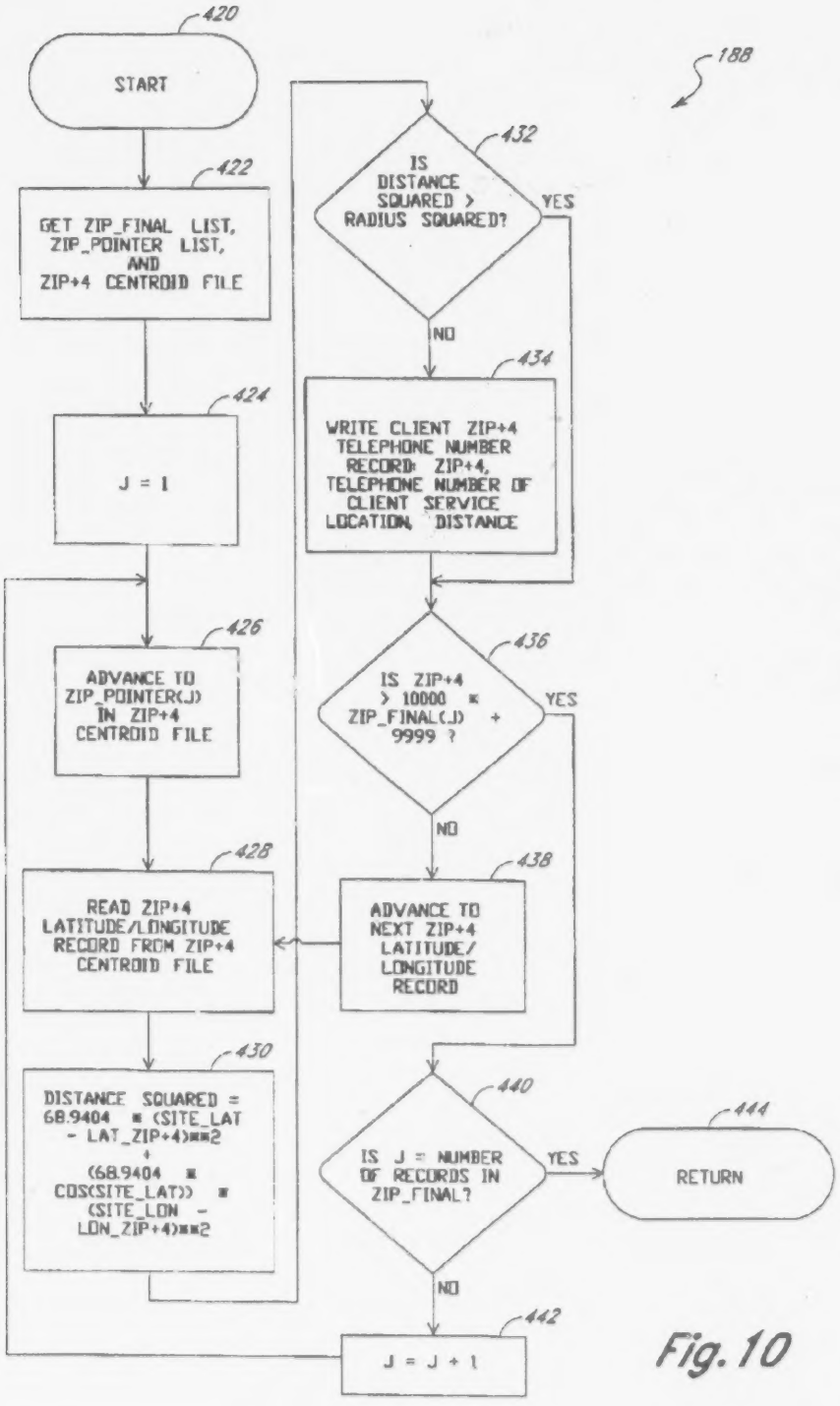
420
START
188
422
GET ZIP_FINAL LIST, ZIP_POINTER LIST, AND ZIP+4 CENTROID FILE
424
J = 1
426
ADVANCE TO ZIP_POINTER(J) IN ZIP+4 CENTROID FILE
428
READ ZIP+4 LATITUDE/LONGITUDE RECORD FROM ZIP+4 CENTROID FILE
430
DISTANCE SQUARED = 68.9404 * (SITE_LAT - LAT_ZIP+4)**2 + (68.9404 * COS(SITE_LAT)) * (SITE_LON - LON_ZIP+4)**2
432
IS DISTANCE SQUARED > RADIUS SQUARED?
YES
NO
434
WRITE CLIENT ZIP+4 TELEPHONE NUMBER RECORD: ZIP+4, TELEPHONE NUMBER OF CLIENT SERVICE LOCATION, DISTANCE
436
IS ZIP+4 > 10000 * ZIP_FINAL(J) + 9999 ?
YES
NO
438
ADVANCE TO NEXT ZIP+4 LATITUDE/ LONGITUDE RECORD
440
IS J = NUMBER OF RECORDS IN ZIP_FINAL?
YES
444
RETURN
NO
442
J = J + 1

Fig. 10

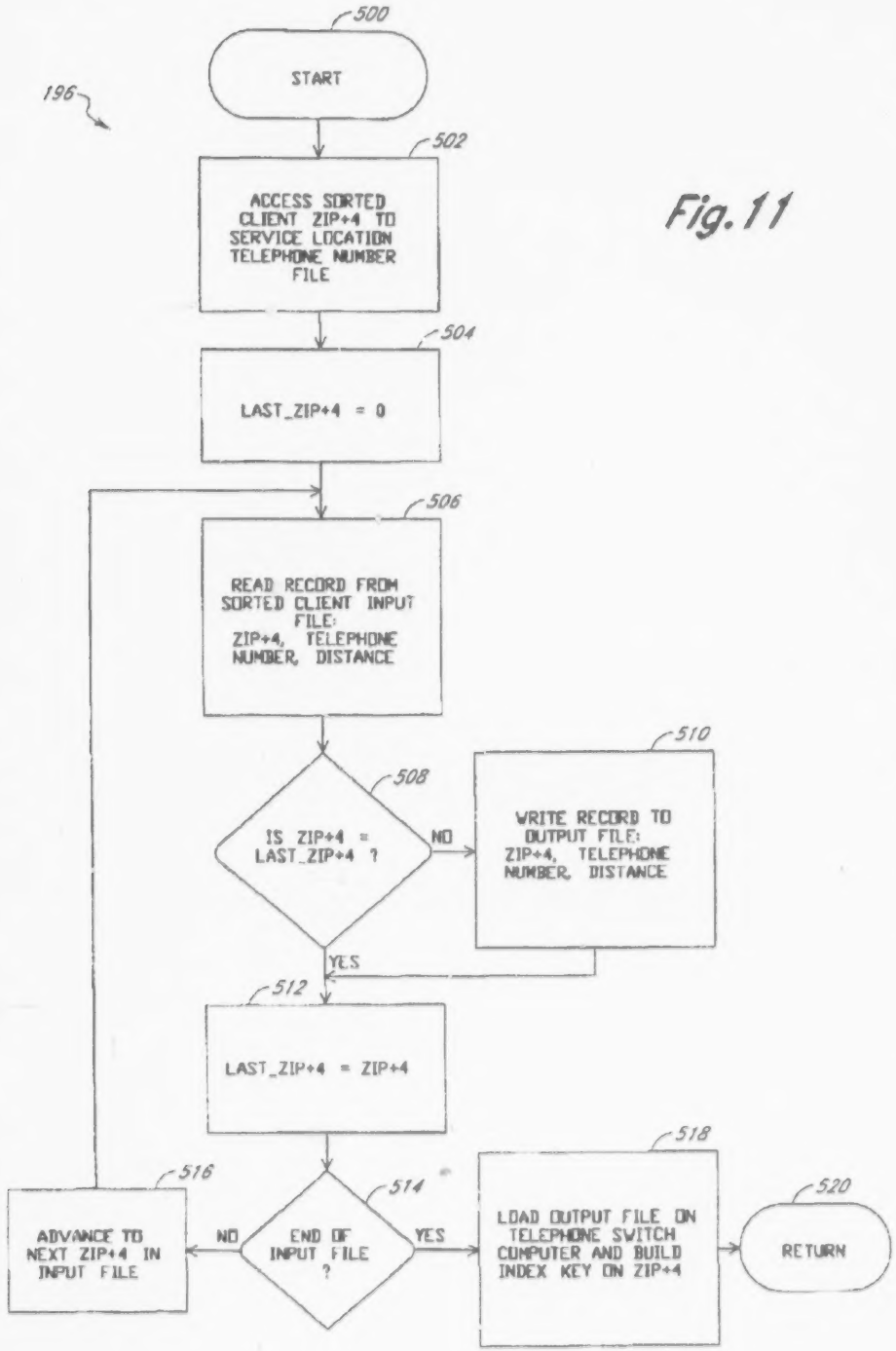
196
500
START
502
ACCESS SORTED CLIENT ZIP+4 TO SERVICE LOCATION TELEPHONE NUMBER FILE
504
LAST_ZIP+4 = 0
506
READ RECORD FROM SORTED CLIENT INPUT FILE: ZIP+4, TELEPHONE NUMBER, DISTANCE
508
IS ZIP+4 = LAST_ZIP+4 ?
NO
510
WRITE RECORD TO OUTPUT FILE: ZIP+4, TELEPHONE NUMBER, DISTANCE
YES
512
LAST_ZIP+4 = ZIP+4
514
END OF INPUT FILE ?
NO
YES
516
ADVANCE TO NEXT ZIP+4 IN INPUT FILE
518
LOAD OUTPUT FILE ON TELEPHONE SWITCH COMPUTER AND BUILD INDEX KEY ON ZIP+4
520
RETURN

Fig. 11

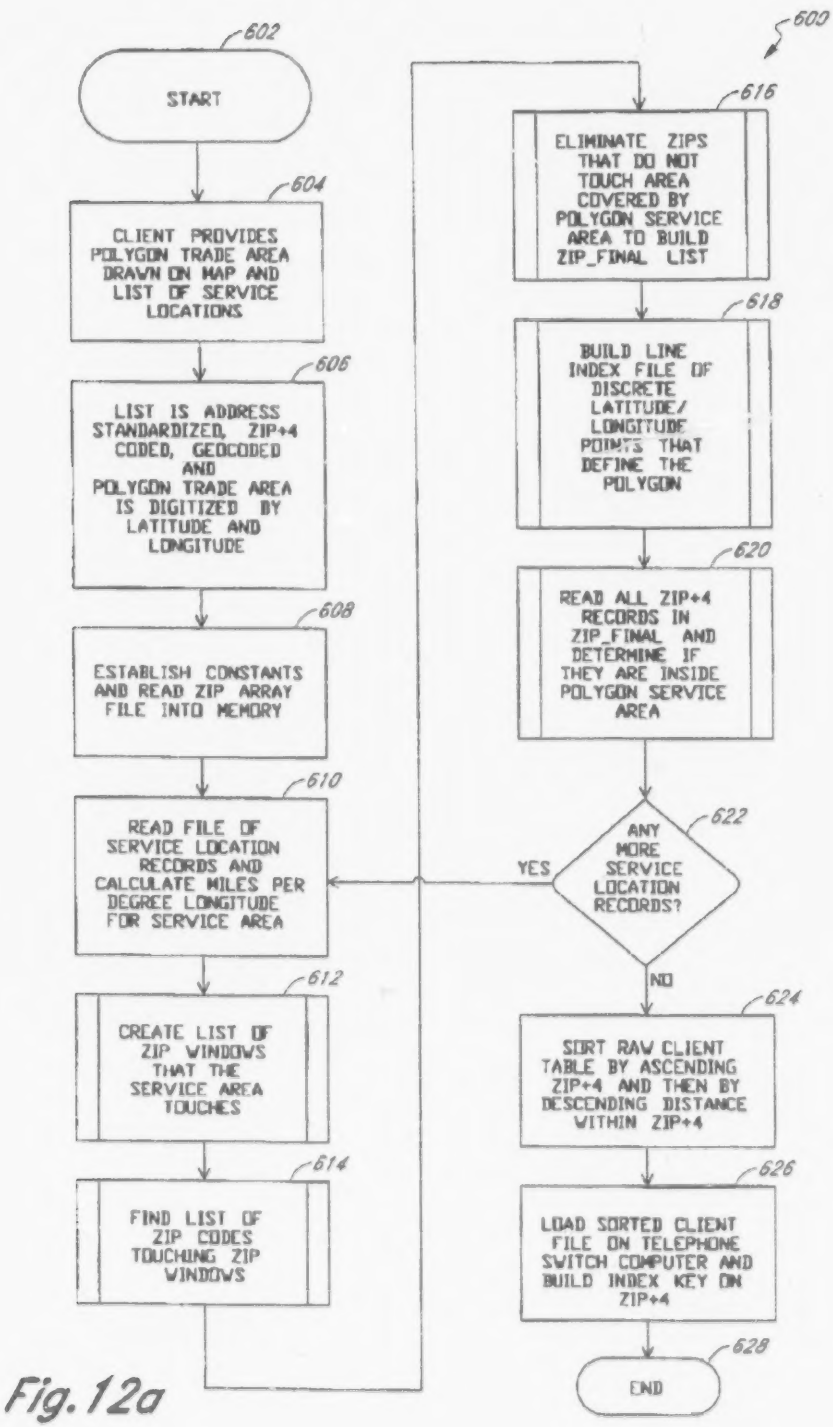
600
602
START
604
CLIENT PROVIDES POLYGON TRADE AREA DRAWN ON MAP AND LIST OF SERVICE LOCATIONS
606
LIST IS ADDRESS STANDARDIZED, ZIP+4 CODED, GEOCODED AND POLYGON TRADE AREA IS DIGITIZED BY LATITUDE AND LONGITUDE
608
ESTABLISH CONSTANTS AND READ ZIP ARRAY FILE INTO MEMORY
610
READ FILE OF SERVICE LOCATION RECORDS AND CALCULATE MILES PER DEGREE LONGITUDE FOR SERVICE AREA
612
CREATE LIST OF ZIP WINDOWS THAT THE SERVICE AREA TOUCHES
614
FIND LIST OF ZIP CODES TOUCHING ZIP WINDOWS
616
ELIMINATE ZIPS THAT DO NOT TOUCH AREA COVERED BY POLYGON SERVICE AREA TO BUILD ZIP_FINAL LIST
618
BUILD LINE INDEX FILE OF DISCRETE LATITUDE/ LONGITUDE POINTS THAT DEFINE THE POLYGON
620
READ ALL ZIP+4 RECORDS IN ZIP_FINAL AND DETERMINE IF THEY ARE INSIDE POLYGON SERVICE AREA
622
ANY MORE SERVICE LOCATION RECORDS?
YES
NO
624
SORT RAW CLIENT TABLE BY ASCENDING ZIP+4 AND THEN BY DESCENDING DISTANCE WITHIN ZIP+4
626
LOAD SORTED CLIENT FILE ON TELEPHONE SWITCH COMPUTER AND BUILD INDEX KEY ON ZIP+4
628
END

Fig. 12a

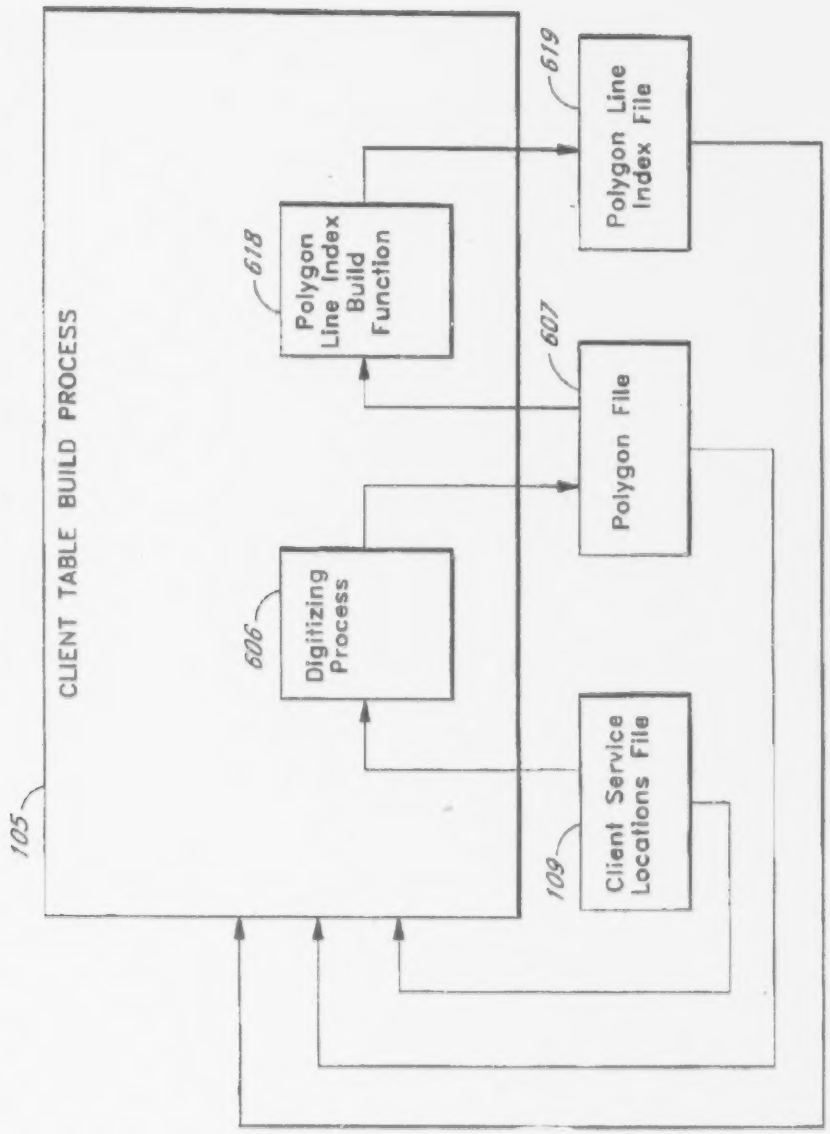
CLIENT TABLE BUILD PROCESS
105
Digitizing Process
606
Polygon Line Index Build Function
618
Client Service Locations File
109
Polygon File
607
Polygon Line Index File
619

Fig. 12b

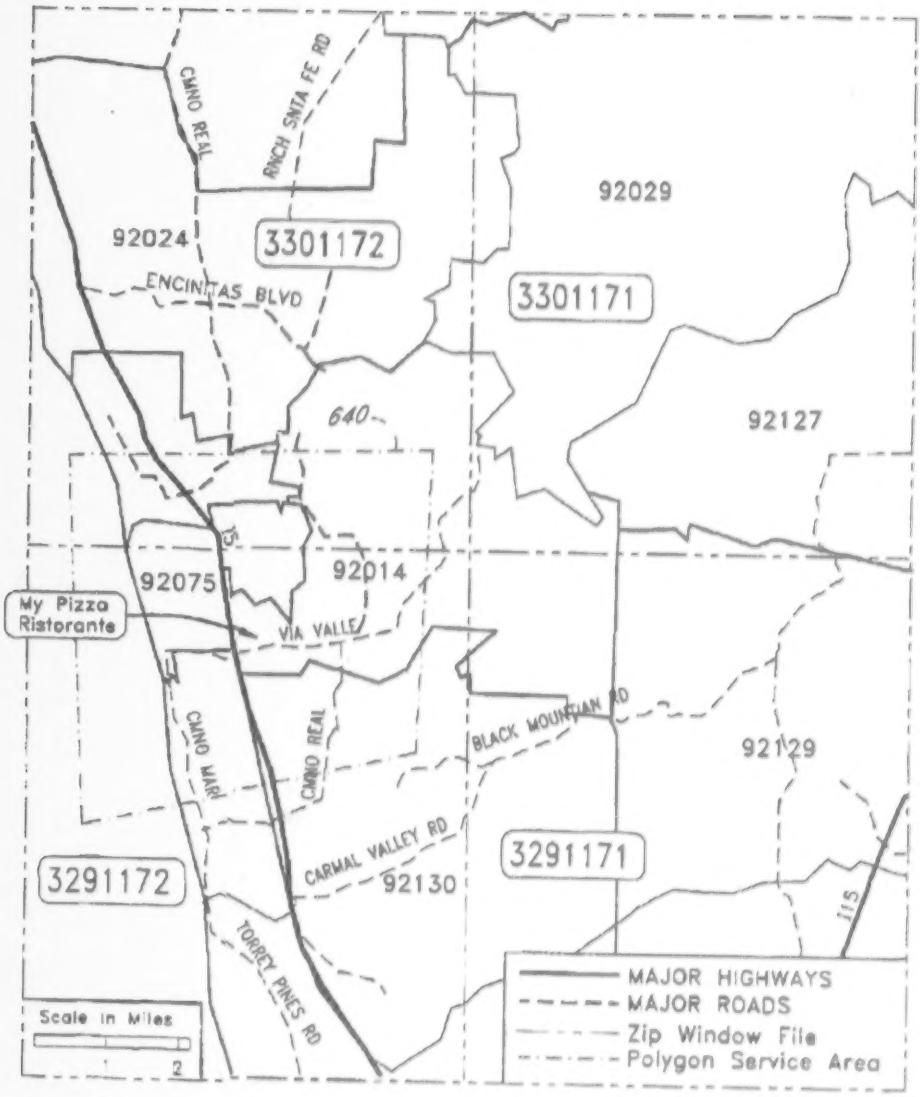
CAMINO REAL
RANCH SANTA FE RD
92024
3301172
ENCINITAS BLVD
92029
3301171
640
92127
15
92075
92014
My Pizza Ristorante
VIA VALLE
CAMINO MAR
CAMINO REAL
BLACK MOUNTAIN RD
92129
CARMAL VALLEY RD
3291172
92130
3291171
TORREY PINES RD
15
Scale in Miles
1 2
MAJOR HIGHWAYS
MAJOR ROADS
Zip Window File
Polygon Service Area

Fig. 13

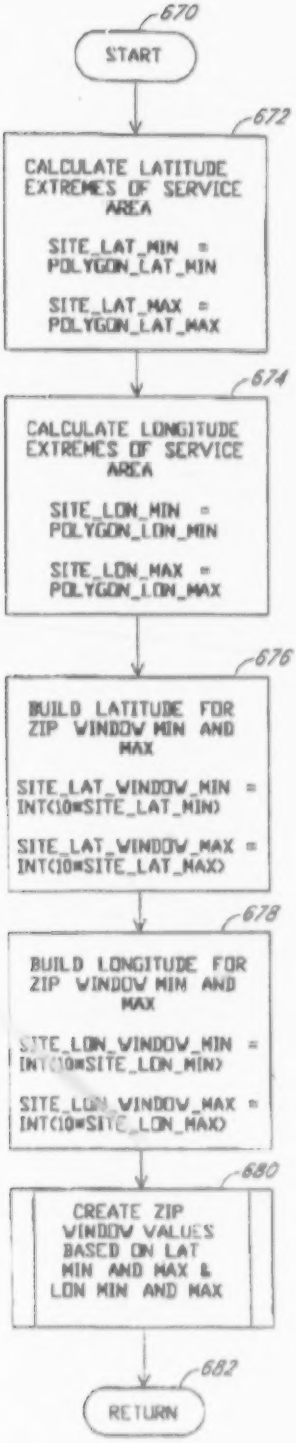
670
START
612
672
CALCULATE LATITUDE EXTREMES OF SERVICE AREA
SITE_LAT_MIN = POLYGON_LAT_MIN
SITE_LAT_MAX = POLYGON_LAT_MAX
674
CALCULATE LONGITUDE EXTREMES OF SERVICE AREA
SITE_LON_MIN = POLYGON_LON_MIN
SITE_LON_MAX = POLYGON_LON_MAX
676
BUILD LATITUDE FOR ZIP WINDOW MIN AND MAX
SITE_LAT_WINDOW_MIN = INT(10*SITE_LAT_MIN)
SITE_LAT_WINDOW_MAX = INT(10*SITE_LAT_MAX)
678
BUILD LONGITUDE FOR ZIP WINDOW MIN AND MAX
SITE_LON_WINDOW_MIN = INT(10*SITE_LON_MIN)
SITE_LON_WINDOW_MAX = INT(10*SITE_LON_MAX)
680
CREATE ZIP WINDOW VALUES BASED ON LAT MIN AND MAX & LON MIN AND MAX
682
RETURN

Fig. 14

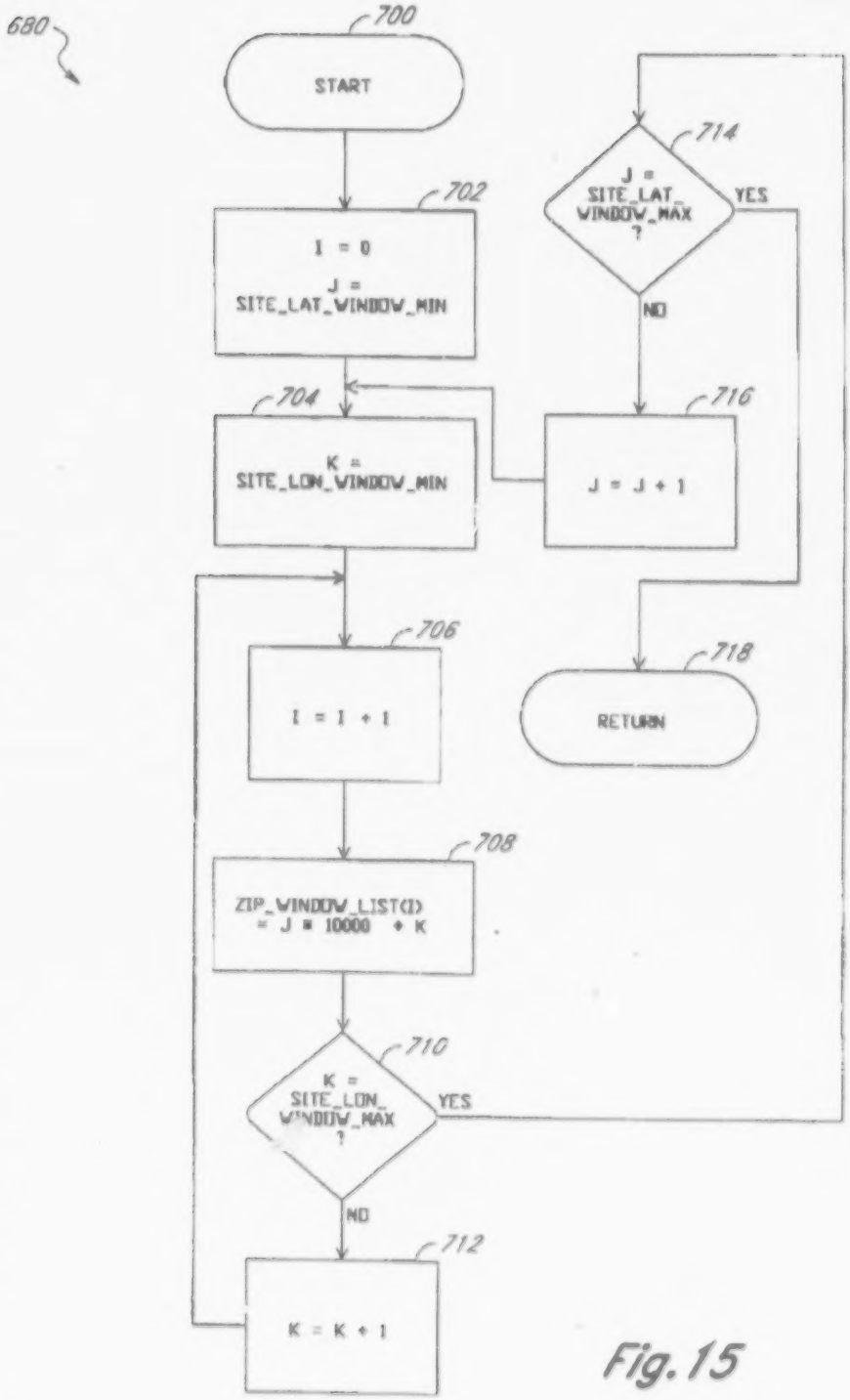
680
700
START
702
I = 0
J = SITE_LAT_WINDOW_MIN
704
K = SITE_LON_WINDOW_MIN
706
I = I + 1
708
ZIP_WINDOW_LIST(I) = J * 10000 + K
710
K = SITE_LON_WINDOW_MAX ?
YES
NO
712
K = K + 1
714
J = SITE_LAT_WINDOW_MAX ?
YES
NO
716
J = J + 1
718
RETURN

Fig. 15

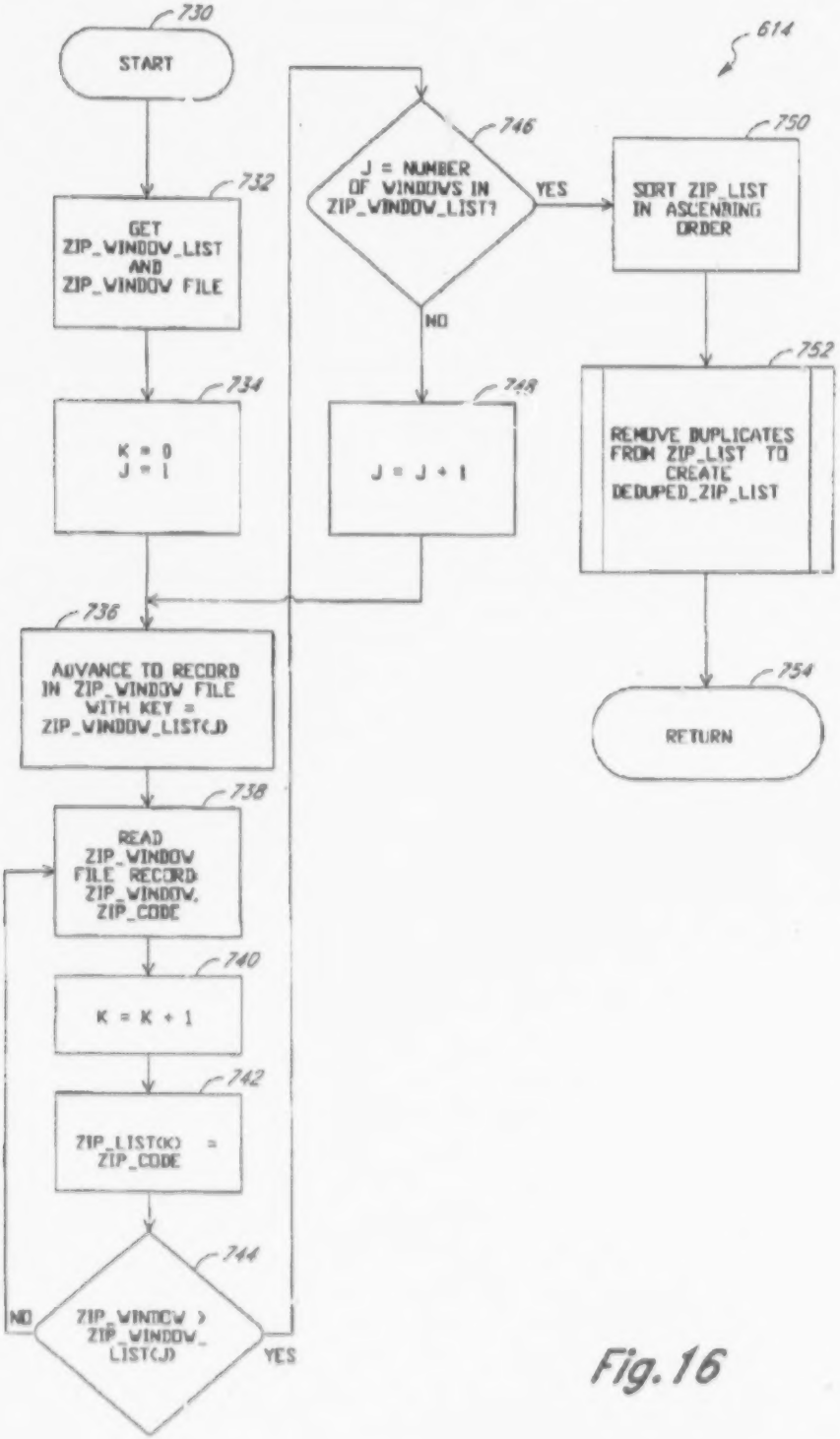
730
START
614
732
GET ZIP_WINDOW_LIST AND ZIP_WINDOW FILE
734
K = 0
J = 1
736
ADVANCE TO RECORD IN ZIP_WINDOW FILE WITH KEY = ZIP_WINDOW_LIST(J)
738
READ ZIP_WINDOW FILE RECORD ZIP_WINDOW, ZIP_CODE
740
K = K + 1
742
ZIP_LIST(K) = ZIP_CODE
744
ZIP_WINDOW > ZIP_WINDOW_LIST(J)
NO
YES
746
J = NUMBER OF WINDOWS IN ZIP_WINDOW_LIST?
YES
NO
748
J = J + 1
750
SORT ZIP_LIST IN ASCENDING ORDER
752
REMOVE DUPLICATES FROM ZIP_LIST TO CREATE DEDUPED_ZIP_LIST
754
RETURN

Fig. 16

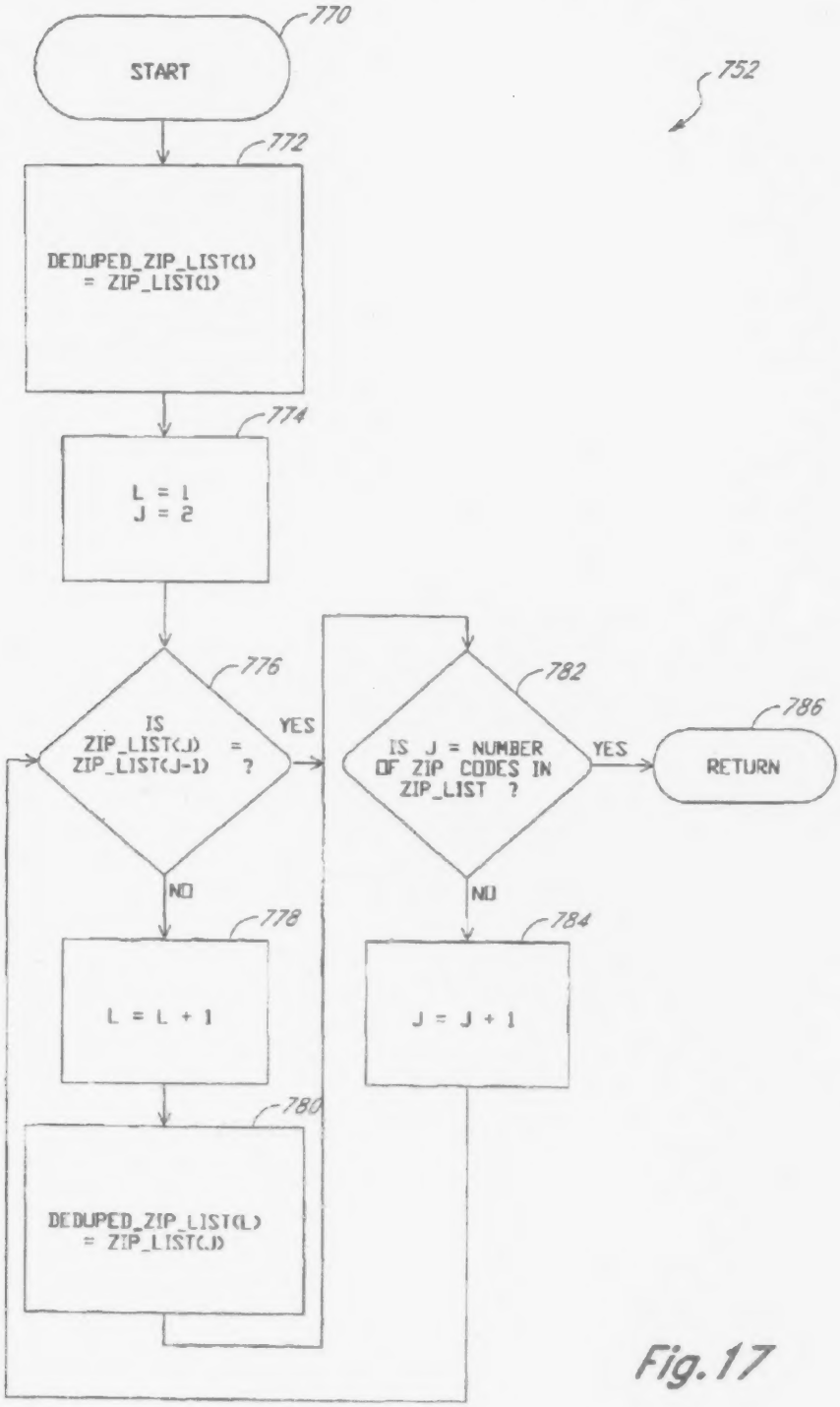
770
START
752
772
DEDUPED_ZIP_LIST(1) = ZIP_LIST(1)
774
L = 1
J = 2
776
IS ZIP_LIST(J) = ZIP_LIST(J-1) ?
YES
NO
782
IS J = NUMBER OF ZIP CODES IN ZIP_LIST ?
YES
786
RETURN
NO
778
L = L + 1
784
J = J + 1
780
DEDUPED_ZIP_LIST(L) = ZIP_LIST(J)

Fig. 17

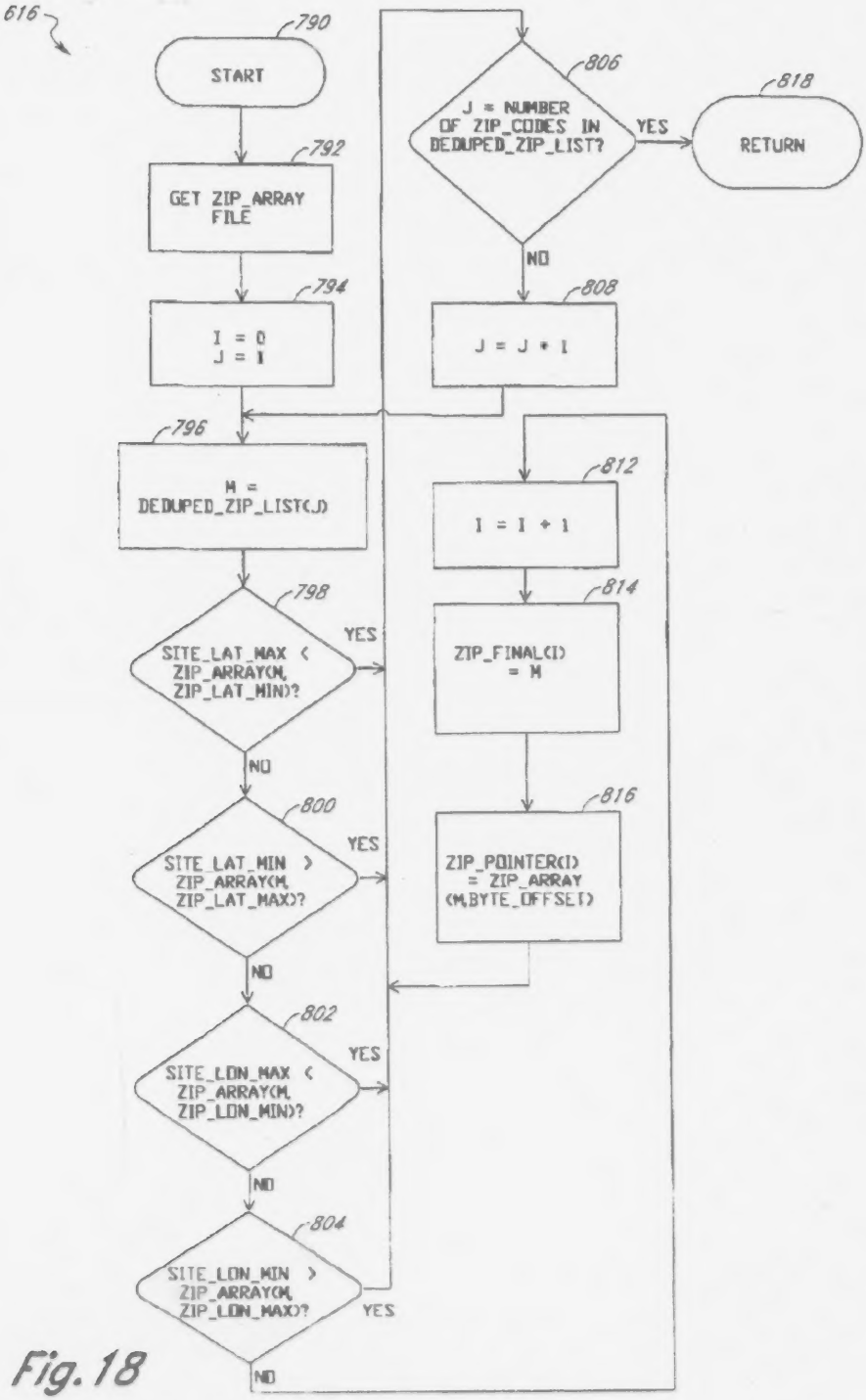
616
790
START
792
GET ZIP_ARRAY FILE
794
I = 0
J = 1
796
M = DEDUPED_ZIP_LIST(J)
798
SITE_LAT_MAX < ZIP_ARRAY(M, ZIP_LAT_MIN)?
YES
NO
800
SITE_LAT_MIN > ZIP_ARRAY(M, ZIP_LAT_MAX)?
YES
NO
802
SITE_LON_MAX < ZIP_ARRAY(M, ZIP_LON_MIN)?
YES
NO
804
SITE_LON_MIN > ZIP_ARRAY(M, ZIP_LON_MAX)?
YES
NO
806
J = NUMBER OF ZIP_CODES IN DEDUPED_ZIP_LIST?
YES
NO
808
J = J + 1
812
I = I + 1
814
ZIP_FINAL(I) = M
816
ZIP_POINTER(I) = ZIP_ARRAY (M,BYTE_OFFSET)
818
RETURN

Fig. 18

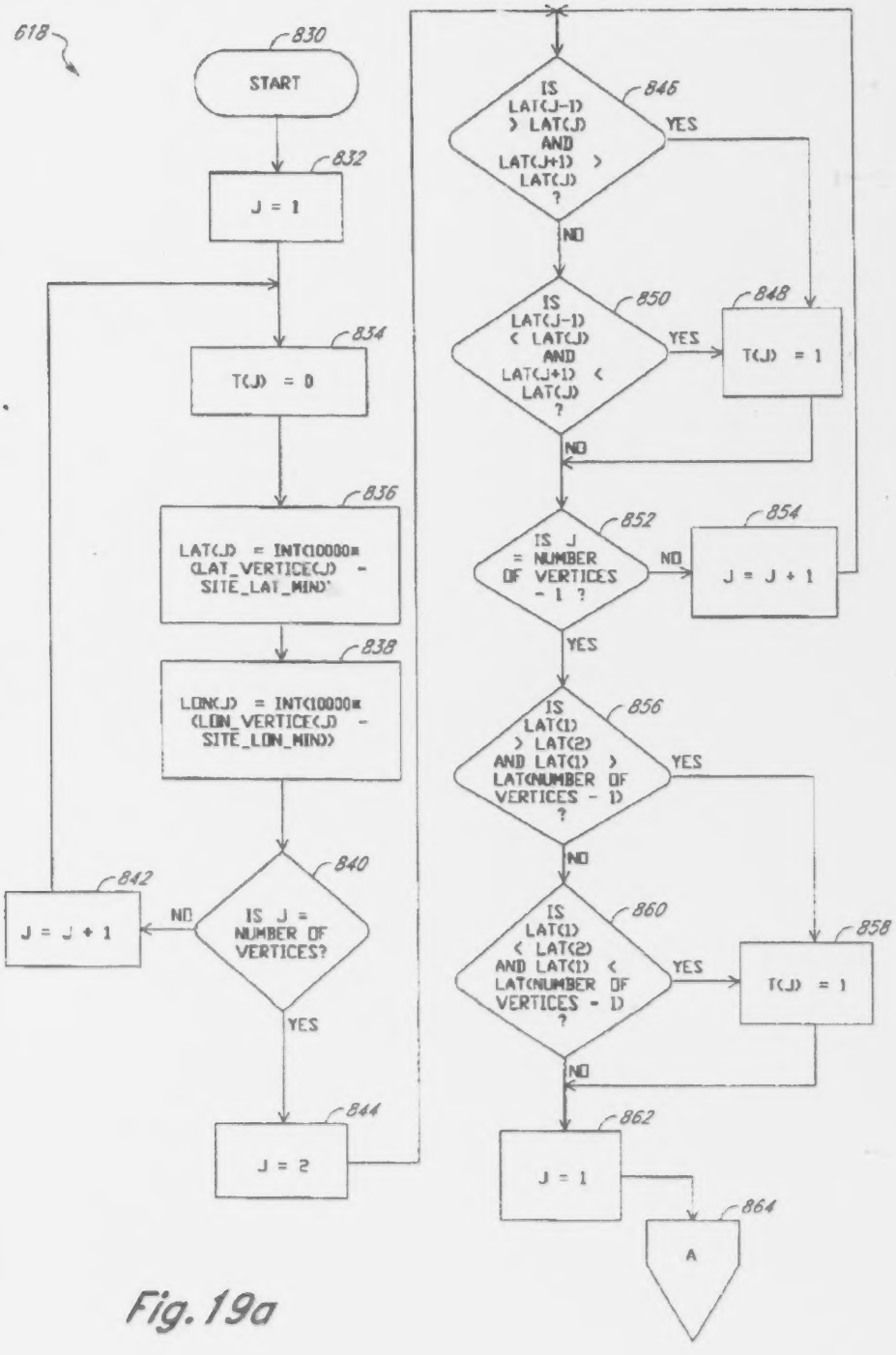
618
830
START
832
J = 1
834
T(J) = 0
836
LAT(J) = INT(10000*(LAT_VERTICE(J) - SITE_LAT_MIN))
838
LON(J) = INT(10000*(LON_VERTICE(J) - SITE_LON_MIN))
840
IS J = NUMBER OF VERTICES?
NO
842
J = J + 1
YES
844
J = 2
846
IS LAT(J-1) > LAT(J) AND LAT(J+1) > LAT(J) ?
YES
NO
848
T(J) = 1
850
IS LAT(J-1) < LAT(J) AND LAT(J+1) < LAT(J) ?
YES
NO
852
IS J = NUMBER OF VERTICES - 1 ?
NO
854
J = J + 1
YES
856
IS LAT(1) > LAT(2) AND LAT(1) > LAT(NUMBER OF VERTICES - 1) ?
YES
NO
858
T(J) = 1
860
IS LAT(1) < LAT(2) AND LAT(1) < LAT(NUMBER OF VERTICES - 1) ?
YES
NO
862
J = 1
864
A

Fig. 19a

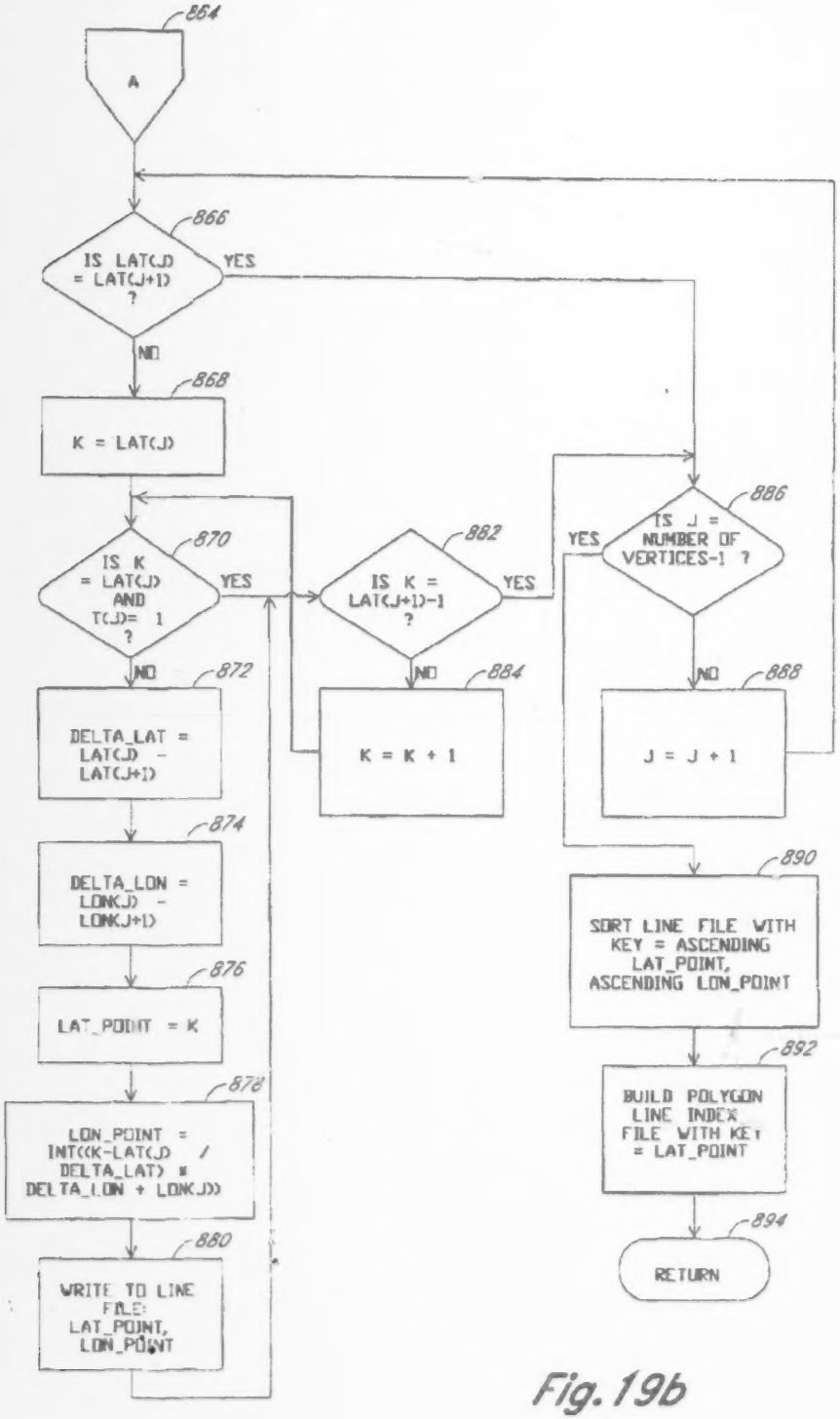
864
A
866
IS LAT(J) = LAT(J+1) ?
YES
NO
868
K = LAT(J)
870
IS K = LAT(J) AND T(J)= 1 ?
YES
NO
872
DELTA_LAT = LAT(J) - LAT(J+1)
874
DELTA_LON = LON(J) - LON(J+1)
876
LAT_POINT = K
878
LON_POINT = INT((K-LAT(J) / DELTA_LAT) * DELTA_LON + LON(J))
880
WRITE TO LINE FILE: LAT_POINT, LON_POINT
882
IS K = LAT(J+1)-1 ?
YES
NO
884
K = K + 1
886
IS J = NUMBER OF VERTICES-1 ?
YES
NO
888
J = J + 1
890
SORT LINE FILE WITH KEY = ASCENDING LAT_POINT, ASCENDING LON_POINT
892
BUILD POLYGON LINE INDEX FILE WITH KEY = LAT_POINT
894
RETURN

Fig. 19b

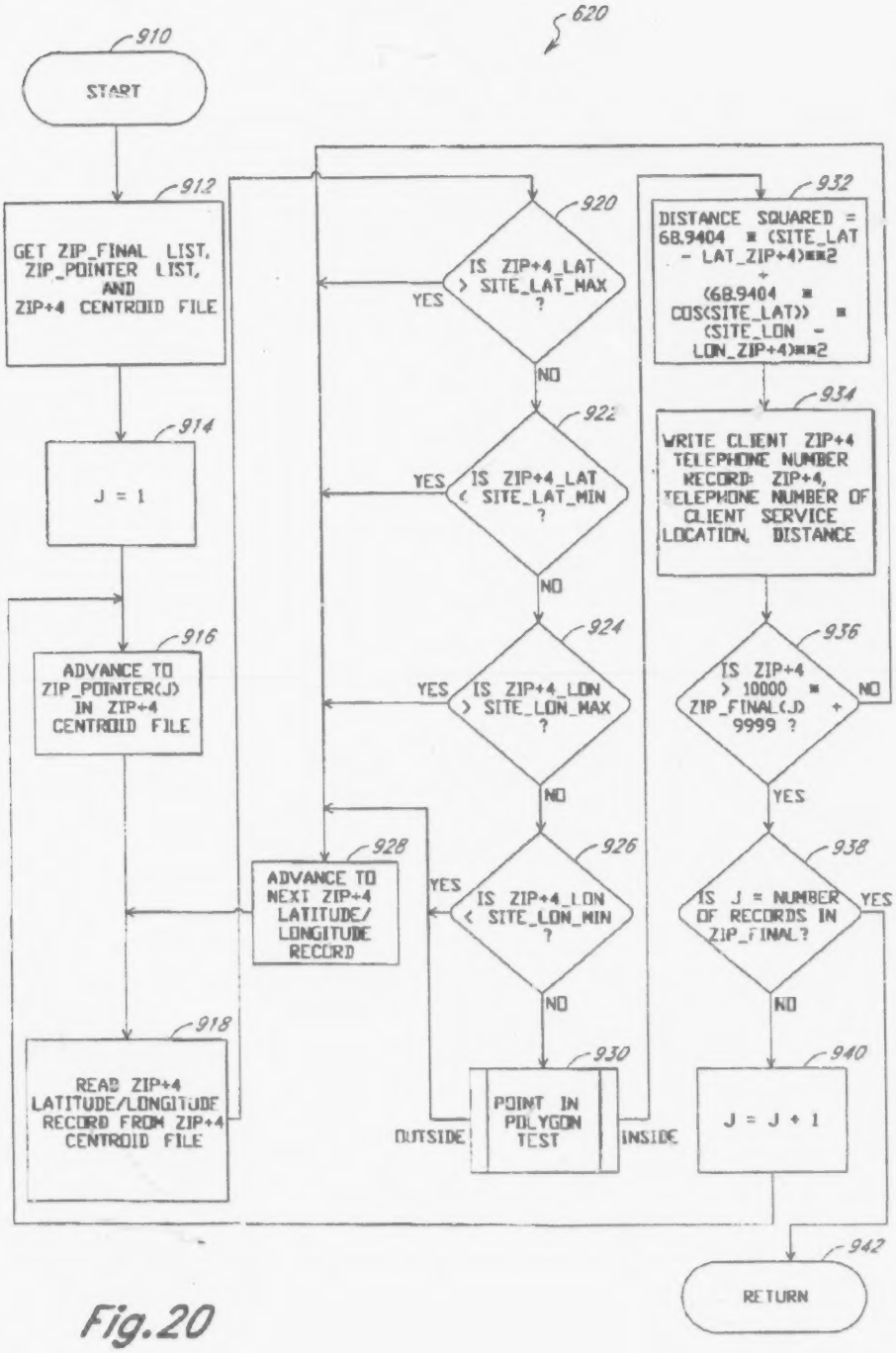
620
910
START
912
GET ZIP_FINAL LIST, ZIP_POINTER LIST, AND ZIP+4 CENTROID FILE
914
J = 1
916
ADVANCE TO ZIP_POINTER(J) IN ZIP+4 CENTROID FILE
918
READ ZIP+4 LATITUDE/LONGITUDE RECORD FROM ZIP+4 CENTROID FILE
920
IS ZIP+4_LAT > SITE_LAT_MAX ?
YES
NO
922
IS ZIP+4_LAT < SITE_LAT_MIN ?
YES
NO
924
IS ZIP+4_LON > SITE_LON_MAX ?
YES
NO
926
IS ZIP+4_LON < SITE_LON_MIN ?
YES
NO
928
ADVANCE TO NEXT ZIP+4 LATITUDE/ LONGITUDE RECORD
930
POINT IN POLYGON TEST
OUTSIDE
INSIDE
932
DISTANCE SQUARED = 68.9404 * (SITE_LAT - LAT_ZIP+4)**2 + (68.9404 * COS(SITE_LAT)) * (SITE_LON - LON_ZIP+4)**2
934
WRITE CLIENT ZIP+4 TELEPHONE NUMBER RECORD: ZIP+4, TELEPHONE NUMBER OF CLIENT SERVICE LOCATION, DISTANCE
936
IS ZIP+4 > 10000 * ZIP_FINAL(J) + 9999 ?
NO
YES
938
IS J = NUMBER OF RECORDS IN ZIP_FINAL?
YES
NO
940
J = J + 1
942
RETURN

Fig.20

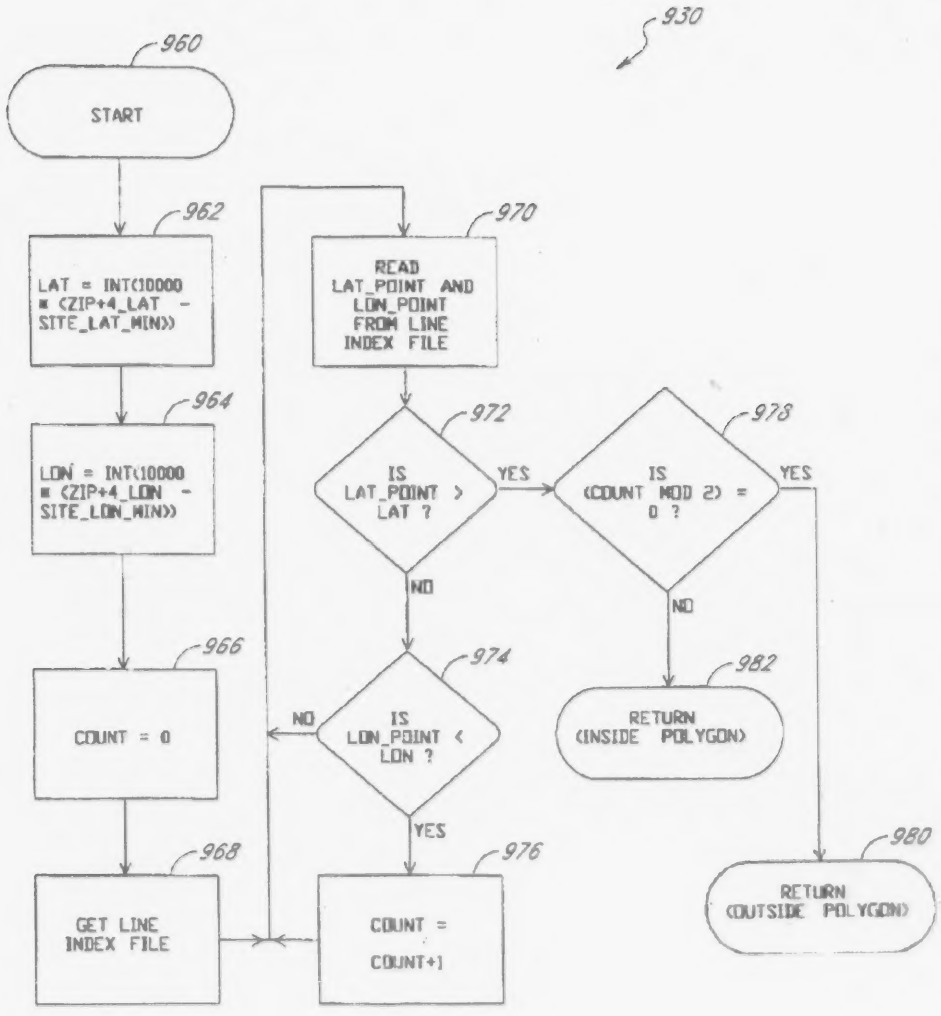
930
960
START
962
LAT = INT(10000 * (ZIP+4_LAT - SITE_LAT_MIN))
964
LON = INT(10000 * (ZIP+4_LON - SITE_LON_MIN))
966
COUNT = 0
968
GET LINE INDEX FILE
970
READ LAT_POINT AND LON_POINT FROM LINE INDEX FILE
972
IS LAT_POINT > LAT ?
YES
NO
974
IS LON_POINT < LON ?
NO
YES
976
COUNT = COUNT+1
978
IS (COUNT MOD 2) = 0 ?
YES
NO
980
RETURN (OUTSIDE POLYGON)
982
RETURN (INSIDE POLYGON)

Fig.21

AUTOMATIC ROUTING SYSTEM FOR TELEPHONIC SERVICES

This application is a continuation of application Ser. No. 08/020,653, filed Feb. 22, 1993, now abandoned.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention generally relates to telephonic services and routing technologies and, more specifically, to a system for automatically routing telephone calls.

2. Background of the Invention

In the increasingly competitive business world, there have been various attempts to automatically route telephone calls made to an "1-800" number or equivalent for a local store, franchise, branch, dealer or service company (henceforth, service location), whose service area encompasses the caller location for the product or service associated with the "1-800" number. For example, a person would dial 1-800-Italian from any Touch Tone® phone (93 percent of U.S. phones are Touch Tone) in the United States, and the phone would ring at the MyPizza (a fictitious business) service location that delivers pizza to the location of the calling telephone.

There have been several previous simplistic attempts to automatically route calls to a service location that is geographically proximate to the caller. These routing technologies are based on routing the incoming call to a location with the same telephone prefix as the originating call, to the same 5-digit zip code, to all zip codes that have the same city name, or a combination of the above. A telephone prefix or exchange is identified by the middle three digits of a ten digit telephone number. For example, in 619-942-9999, the prefix or exchange is 942. Usually all telephone numbers with the same prefix are serviced by the same wire center. A wire center is the geographical area serviced by a single telephone company office. The wire center is usually one switch, but can be multiple switches, and usually provides service to about ten exchanges. By definition of the telephone companies, wire centers do not overlap.

A. Prior Routing System Structure

The earth is a sphere, and any point on its surface can be defined by a latitude and longitude spherical coordinate system developed several centuries ago. Using this coordinate system, spherical trigonometry, and a computer, it is possible to calculate the distance between any two locations on the earth and determine if one location lies within a specified radius of another or determine if a location is contained within an irregular service area defined as a spherical polygon.

Several years ago, AT&T instituted the technology of passing the calling telephone number along the telephone network, by use of Automatic Number Identification (ANI), to facilitate billing. The "Caller ID" feature, available on some telephone networks, utilizes the ANI technology to identify the telephone number of the calling party. Since a modern telephone switch is just a special purpose computer, it is a simple process for the switch handling the call to look up in a record table (of over one hundred million records) the calling telephone number with an assigned service location telephone number and route the call to the service telephone number.

However, there were some fairly formidable problems that needed to be solved before this routing process could be a commercially viable and practical service. The first problem was initially determining the latitude and longitude of every telephone number in the United States and keeping them updated when twenty percent of the consumer population moves every year and businesses are continually opening and closing locations. The second problem was performing the multitude of spherical trigonometric calculations which is several orders of magnitude beyond today's most powerful computers that are required to create the calling telephone number to the service location telephone number tables and to keep them updated in a constantly changing environment.

Several key databases and technologies are necessary to solve these problems. The United States Census Bureau, as part of the 1990 census, built a national latitude and longitude cartographic map of the United States called TIGER (Topological Integrated Geographical Encoding and Referencing) that contains almost every street link in the United States. A street link is a street segment intersected by other streets at each end. The TIGER record for all street links contains the latitude and longitude coordinates at each end of the street segment accurate to within plus or minus thirty feet and, for most street segments, the starting and ending address ranges for each side of the street. Where the Census Bureau did not complete the address ranges, private companies have filled in the gaps and are updating TIGER as new streets are built.

In the past, the U.S. Postal Service (the "Post Office") divided the U.S. into postal delivery areas called zip (zone improvement plan) codes to help automate the routing of mail. At the nine digit level (called "zip+4"), these zip codes usually correspond to a single side of a street link. In addition to geographically dividing the United States into small postal delivery areas, the Post Office also set standards for the naming of places and streets. For direct mailers to get discounts, they had to standardize their mailing addresses to match the Post Office's naming conventions and provide a zip+4 code. To facilitate the process of postal address standardization and zip+4 coding, the Post Office provides a national Zip+4 Address Coding Guide and has certified several commercially available software packages that correctly address standardize and zip+4 code 99 percent plus of the address records on a Post Office test file. It is well known that file or table records comprise one or more fields.

Recently, the Post Office and some private companies have matched the Post Office's Zip+4 Address Coding Guide with TIGER and have created files containing zip+4 codes with latitude and longitude centroids (a zip+4 centroid is the approximate geographical mid-point of a zip+4 code). This type of file is referred to as a zip+4 latitude and longitude centroid file 100 (FIG. 1a). These centroids are accurate 95 percent of the time to within plus or minus 105 feet in relation to a house or business receiving mail at a street address assigned to a given zip+4 code. Today, it is a very reliable and economical process to address standardize and zip+4 code a list identifying physical locations, such as a master list of phone numbers of the present invention.

Other changes and improvements in telecommunications technology were needed to make the automated telephone call routing process a commercially viable and practical service. Improvements in the telecommunication infrastructure in the U.S. have changed the telecommunication cost structure. Presently the cost of a telephone call from Los Angeles to New York is about the same as for a call from Los Angeles to San Diego. Therefore, the physical location of a central routing switch is no longer critical, or in other words, can be anywhere in the continental U.S.

Another improvement of telecommunications technology is the advent of Geographic Information Systems, com-

monly called GIS. These systems allow the aggregation and display of almost any data for any area, any size or shape, anywhere in the United States by interactive maps. The popularity of these systems has lead to the development of sophisticated techniques and algorithms to handle geographically based information. Of primary interest is the linking of the geographic information to telephone numbers, especially at the 10-digit level (area code-prefix-suffix).

The complex process of spherical trigonometric distance calculations on billions of possible permutations has been alleviated by making the process less computer intensive. Instead of performing complex trigonometric spherical calculations, a technique that is less than one-thousandth as computer intensive is used. This technique is based on doing a polyconic projection from each service location and performing simple two dimensional distance squared tests. There are approximately 68.9404 miles per degree latitude. However, the miles per degree longitude varies with the latitude. At a given latitude, the miles per degree longitude is equal to the cosine of the latitude multiplied by 68.9404. By using the service location as the latitude point and knowing the latitude and longitude of calling points, it is easy to obtain a delta latitude and longitude, translate them into miles, and perform a simple distance calculation, i.e., "distance=SQRT(X**2+Y**2)". This polyconic projection technique results in a distance calculation error of approximately 12 feet for two locations that are 100 miles apart at 40 degrees latitude. However, additional reduction of the computational effort is necessary to have a practical, efficient, and commercially viable routing process.

B. Prior Routing System Operation

Previous technologies for routing "1-800" telephone number calls to a service location have one or more of the following three problems:

(1) Many such routing systems are very coarse in their level of precision and cannot handle small service areas with legally defined franchise territories like pizza delivery. A much more precise system is desired that is accurate to within 105 feet rather than previous accuracies to within 10 miles. Such a system would utilize very precise distance calculations made possible by knowing the physical location on the earth, most typically expressed as a latitude and longitude, of nearly every non-mobile telephone in the United States. Other coordinate systems could be used in other countries. A business also may like the ability to route a telephone call to a specific franchise territory, which may be an irregularly shaped polygon.

(2) Another problem in routing systems is that they divide the United States into many large arbitrarily defined areas and there is no ability to route a call to the closest service location if the closest location is not located in the same artificially created area as the caller. In many instances, a caller located near the border of an exchange area or 5-digit zip code is much closer to a service location with a different zip code or telephone prefix than the one to which it is routed. A seamless system is desired that does not use artificially created areas such as telephone wire centers, telephone prefixes, or 5-digit zip codes where calls can only be routed within their area. A business may want an option of choosing to route a call to the closest branch or to any branch, for example, in a 5 mile radius of the caller.

(3) Finally, known routing systems often rely on third party telephone directories that are always outdated due to publishing, key entry, and optical character recognition (OCR) scanning time lags and which do not include unlisted numbers. Over 30 percent of the U.S. telephone numbers are unlisted, which includes public pay phones and multiple lines going into businesses and households where only one line is listed. Because consumers and businesses throughout the country change locations on a daily basis, a system is desired that correctly routes a much higher percentage of calls than the previous attempts. In the U.S., such a system would require direct access to the AT&T universe of telephone numbers. Such a system would preferably utilize daily updated and unlisted telephone numbers and involve passing information between regulated telephone databases maintained by the telephone companies and client databases maintained by third parties.

These three deficiencies result in lower customer service and satisfaction, higher costs because of manual exception handling for calls that cannot be routed due to a variety of reasons, costs of misrouting, and high on-going maintenance costs. Manual exception handling generally requires operator intervention in the "1-800" call.

Other previous systems require the consumer to enter their zip code or telephone prefix on the Touch Tone keypad in response to voice prompting from the system. Based on the caller-entered data on the keypad, the telephone call is forwarded to a destination telephone. Other similar systems will simply inform the consumer, by a voice message, of another telephone number for the local dealer, which must be manually dialed rather than forwarding the call automatically. A system is desired that does not require any additional customer interaction or input. Such a system would be totally automatic by utilizing, at a minimum, the 10-digit telephone numbers in the standard telephone packet that can only be accessed and utilized by regulated telephone companies on a national basis. The telephone packet includes the complete origin and destination telephone numbers.

The basis of an automatic telephone routing system must include a means to automatically identify the telephone number of the calling party. Such a system is disclosed by Kaplan, U.S. Pat. No. 5,163,087. This system translates an Automatic Number Identification (ANI) of the calling party into a customer database key previously defined by the called party. The database key, e.g., customer account number, is then provided to the called party instead of the ANI information such that a computer at the called business can process the key to look up and present customer information to an agent of the business. This system assumes that the caller has called this business at a previous time to provide information to the agent of the business to create a customer record or other similar information. The Kaplan system delivers the database key to one business location rather than a plurality of service locations throughout the country. The delivery of the database key to the business requires an Integrated Services Digital Network (ISDN) or similar facility, which is an additional burden for the business.

An automatic routing system should not need to deliver a database key or message to the final destination, but would merely utilize the ANI information as an index to a table containing partitions of a country into small geographic areas, such as postal service zip+4 codes. These partitions would be further utilized to access one of a plurality of service locations that may be anywhere within the country.

A current system for telephone call routing is described in U.S. Pat. No. 4,757,267 to Riskin. Riskin employs automatic number identification (ANI) for routing calls from a caller to a dealer located within the same area code and prefix (first six digits of a 10-digit telephone number, the "6-digit number") as the caller. Because the area identified by the 6-digit number is fairly large and there may be several dealers within the area, the dealer location is usually selected from a list of several locations based on random selection,

or weighted percentage assigned to each location. Alternatively, the caller is presented with a list of possible dealer locations for the large geographic area because the system does not know which service locations are closer than the others. Riskin uses the 6-digit number to determine the location of both the caller and the service location. Riskin assumes the location of the caller to be the location of the central office switch that services the caller's 6-digit exchange (which can be 0 to 5 miles from its true location), and assumes the location of the dealer location to be the location of the central office switch that services the dealer location's 6-digit exchange (which can be 0 to 5 miles from its true location) utilizing a coordinate system that is accurate to plus or minus 2300 feet. What is desired is a system that uses all ten digits of the calling and service location telephone numbers and the physical street address of the location of the numbers in connection with a GIS-type database (utilizing a coordinate system that is accurate to within 30 feet) to provide geographic precision to within 105 feet for the location of the calling and destination telephones.

Consequently there is a need for an automated telephone routing system that provides the ability to reduce costs by routing a very high percentage of calls made to a single national telephone number without any human intervention; the marketing advantage for a client of a single, easy to remember, toll free or nominal fee national telephone number; geographically precise results; and the ability of a business to choose among different types of destination service area definitions. Preferably, these service area definitions may include the closest service location to the caller within a predefined distance; all service locations within a specific radius of the caller; and a service location whose service area is defined as an irregular shaped polygon that may or may not overlap with any other polygons.

SUMMARY OF THE INVENTION

The above-mentioned needs are satisfied by the present invention which includes a system and method for automatically routing telephone calls from a caller to a service location.

The present invention provides a method of routing all published and unpublished telephone numbers, including unlisted numbers, secondary unpublished business lines, and public pay phones without any violation of federal, state and local laws. The present invention also provides a method for legally conforming to contracted franchise territory definitions executed between franchisers and franchisees by routing customer's calls precisely to the correct legal franchisee area. Additionally, the present invention provides a method for precisely routing telephone calls based on any geographic definition including postal geography, census geography, telecommunications geography, special grid coordinate geography, and all custom geography.

The present invention provides a method for automatically routing and processing customer calls that do not meet the pre-set client protocols. This "exceptions handling" process routes to a "live" operator who executes preset exceptions handling protocols. The present invention also provides for a method of integrating unrelated geographic information systems and database technology, telecommunications systems and database technology, postal systems and database technology, and computer technology into a common applications driven architecture. Additionally, the present invention provides a method for dynamically and instantaneously updating and integrating Client and Master Tables with no time lags. Furthermore, the present invention provides a method for automating the processing of information that is input by a customer using a customer interface that automatically routes telephone calls to customer requested destinations.

In one aspect of the present invention there is, in a telephone network, an automatic routing system, comprising means for receiving a calling number of a source location, means for converting the entire calling number into a spatial key, means for converting the spatial key into a client number of a destination location, and means for transmitting the client number to the telephone network, wherein the source location is connected to the destination location by the routed telephone call.

In another aspect of the present invention there is a call routing system, comprising a telephone network; a switch connected to the telephone network, the telephone switch having a computer with a memory; a master file comprising a plurality of records, each record having a caller telephone number field and a spatial key field, the master file stored in the computer; a client file comprising a plurality of records, each record having a spatial key field and a client telephone number, the client file stored in the computer; means, within the switch, for receiving a selected caller telephone number from the telephone network; means, within the switch, for linking the master table and the client table to produce a selected client telephone number, wherein the master table is indexed by the selected caller telephone number to provide a selected spatial key, and wherein the client table is indexed by the selected spatial key to provide a selected client telephone number; and means, within the switch, for transmitting the selected client telephone number to the telephone network.

In yet another aspect of the present invention there is, in a telephone network, a method of automatically routing a telephone call, comprising the steps of generating a client table comprising a plurality of records, each record comprising a spatial key and a client telephone number indicative of a service location, storing the client table and a master table comprising a plurality of records, each record comprising a calling telephone number and a spatial key, in the telephone network, receiving a selected calling telephone number from the network, indexing the master table with the selected calling telephone number to obtain a selected master table record, retrieving a selected spatial key from the selected master table record, indexing the client table with the selected spatial key to obtain a selected client table record, and retrieving a selected client telephone number from the selected client table record.

In another aspect of the present invention there is a table generation process, comprising the steps of providing a plurality of service locations comprising two coordinates, each location having a specified service area; windowing the coordinates with a plurality of prestored spatial key windows, each window having an associated spatial key list, each spatial key list having one or more spatial keys, wherein the spatial key is indicative of a spatial key area, thereby providing a selected spatial key list; intersecting spatial key windows with the service area; and creating a client table record including one of the spatial keys from the spatial key list of an intersected spatial key window and the client telephone number of the service area.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1A is a block diagram of the files utilized in the presently preferred Client Table build process of the present invention;

FIG. 1B is a block diagram of a portion of a dynamic central switch linking process of the present invention that uses the result of the table build process of FIG. 1A;

FIGS. 1C–1E are a system level diagram of a presently preferred embodiment of the central switch linking process interconnecting a calling telephone and a destination telephone of the present invention;

FIG. 2 is a map diagram illustrating an example of a routing network for the system of FIGS. 1C–1E;

FIG. 3 is a top-level flow diagram of a process to build a client table using radius defined service areas for the system of FIG. 1C–1E;

FIG. 4 is a map diagram illustrating an example area utilized in the description of the process shown in FIG. 3;

FIG. 5 is a flow diagram of the zip window list function indicated at 182 in FIG. 3;

FIG. 6 is a flow diagram of the zip windows function indicated at 262 in FIG. 5;

FIG. 7 is a flow diagram of the initial zip list function indicated at 184 in FIG. 3;

FIG. 8 is a flow diagram of the remove duplicates from zip list function indicated at 322 in FIG. 7;

FIG. 9 is a flow diagram of the final zip list function indicated at 186 in FIG. 3;

FIG. 10 is a flow diagram of the zip+4 site radius check function indicated at 188 in FIG. 3;

FIG. 11 is a flow diagram of the service location closest to the caller function indicated at 196 in FIG. 3;

FIG. 12A is a top-level flow diagram of a process to build a client table using polygon defined service areas for the system of. FIG. 1;

FIG. 12B is a block diagram of the files utilized in the process of FIG. 12A;

FIG. 13 is a diagram illustrating an example area utilized in the description of the process shown in FIG. 12A;

FIG. 14 is a flow diagram of the zip window list function indicated at 612 in FIG. 12A;

FIG. 15 is a flow diagram of the zip windows function indicated at 680 in FIG. 14,

FIG. 16 is a flow diagram of the initial zip list function indicated at 614 in FIG. 12A;

FIG. 17 is a flow diagram of the remove duplicates from zip list function indicated at 752 in FIG. 16;

FIG. 18 is a flow diagram of the final zip list function indicated at 616 in FIG. 12A;

FIGS. 19A and 19B are a flow diagram of the line index file function indicated at 618 in FIG. 12A;

FIG. 20 is a flow diagram of the zip+4 site polygon check function indicated at 620 in FIG. 12A; and

FIG. 21 is a flow diagram of the point in polygon test function indicated at 930 in FIG. 20.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The following detailed description of the preferred embodiments presents a description of certain specific embodiments to assist in understanding the claims. However, the present invention can be embodied in a multitude of different ways as defined and covered by the claims.

Reference is now made to the drawings wherein like numerals refer to like parts throughout.

For convenience, the discussion of the preferred embodiments will be organized into the following seven principal sections:

I. System Overview;
II. Routing Example;
III. General Client Table Build Process;
IV. Client Table Build Process for a Radius Defined Service Area;
V. Client Table Build Process for the Service Location Closest to the Caller Within a Distance Limit;
VI. Client Table Build Process for a Polygon Defined Service Area; and
VII. Summary.

I. System Overview

The present invention includes an automated telephone routing system which receives input from a common carrier, such as AT&T and AT&T American Transtech. This input includes an updated national list of telephone numbers, telecommunication infrastructure, and exception handling support.

A system and method for automatically and seamlessly routing a telephone call from a calling telephone to a destination telephone selected by a client will be described. In addition, a method of creating the tables utilized by the routing system, according to criteria established by the client, will also be described.

Referring to FIG. 1A, the number of calculations to be performed and permutations that must be tested is reduced in creating the calling telephone number-to-service location telephone number tables used in the "1-800" routing of the present invention. Accordingly, a zip windows file **104** (FIG. 1A) and a process **105** to spatially access and operate on this file are a part of the present invention. It will be understood that the zip windows file **104** is just one embodiment of a spatial windows file which could include different types of spatial keys. The zip windows file **104** contains a list of all zip codes that potentially touch a tenth of a degree (0.1°) latitude and longitude spatial window. By utilizing a set of latitude and longitude extremes (minimums and maximums) for a service area in process **105**, a list of 5-digit zip codes that could overlap with the service area is generated. It is then only necessary to calculate distance or perform a point-in-polygon calculation between each service location and a small subset of zip+4 codes contained within each service area's returned list of 5-digit zip codes. File **104** and process **105** will be explained further and an example given hereinbelow.

Update problems and costs associated with continually updating and periodically rebuilding a hundred million plus record, telephone number-to-telephone number table for each business or client using the automated telephone routing system is solved by creating a dynamically linked, updatable system. Instead of creating a telephone number-to-telephone number table for each client, two tables linked by zip+4 codes, as shown in FIG. **1B**, are created. A telephone number with its corresponding physical street address is assigned to a zip+4 code, and a Master Telephone Number to Zip+4 Table **107** (FIG. 1B) (the "Master Table") is built using the Postal Service's Zip+4 Address Coding Guide, and commercially available software, e.g., CODE-1® available from GROUP 1 Software, Inc. The preferred Master Table, presently maintained by AT&T American Transtech, is indexed or keyed by telephone number, and is updated on a daily basis. When phone numbers are added, changed or deleted, the table is updated. This table is also updated on a periodic basis to handle the approximate one hundred 5-digit zip code changes per quarter year, e.g., when

a new zip code is created, telephone numbers in the new code area must be assigned a new zip+4 code. This represents a fairly small amount of change in relation to the 43,000 zip codes (5-digit) in the United States. At routing time, the present system allows all clients to use the same Master Telephone Number to Zip+4 Table **107**.

Independently, and on an individual client basis, each of over 20 million zip+4 codes is assigned, based on their latitude and longitude centroid coordinates, to one or more service locations using standard distance or point in polygon calculations. Hence, the present invention builds a Client Zip+4 to Service Location Telephone Number Table **106** (the "Client Table", FIGS. **1A** and **1B**) A different table is built for each client or for every "1-800" telephone number that a client may have. The client selects the type of service area definition that is desired for his needs. Three different types of service area definitions are presently utilized: (1) the closest service location to the caller within a predefined distance; (2) all service locations within a specific radius of the caller (there may not be any service location within a particular radius); (3) and a service location whose service area is defined as an irregular shaped polygon that does not overlap with any other polygons. The polygon service area is typical of a franchise type business. The building of Client Tables using these service area definitions will be described hereinbelow.

The Client Table **106** is then preferably provided to AT&T American Transtech for centralized routing at a telephone switch. This table is indexed or keyed by zip+4 code and is updated for each client as they add and delete locations, when they change telephone numbers, and on a periodic basis to handle Post Office zip code changes.

Using the presently preferred system, both the Master Table **107** and the Client Tables **106** are independently maintained by separate organizations. Using the zip+4 code as a spatial key linkage, a calling phone number in the Master Table **107** is then dynamically linked, as shown in FIG. **1B**, to a service location phone number in the Client Table **106** and the call is automatically routed. The spatial key is a single number that identifies a specific geographically defined area, line, or point that is defined by a set of coordinates. For simple geographies like points and rectangles the spatial key can be a coded version of the coordinate description of the geography.

The postal zip+4 code is the preferred spatial key used to link the master table to the client table, but there are other small geographic areas capable of having unique spatial keys, such as zip+6 code areas, census blocks, or very small latitude/longitude grids, tiles, windows, or quad-trees. This two-table indexing approach provides a much higher automated routing rate and a higher percentage of correctly routed calls in an environment where consumers are continually moving and businesses are opening, closing, and/or moving. In addition, the two-table indexing approach also acts as a "fire wall" or buffer between regulated telephone number information and client marketing information to satisfy government regulations.

The system of the present invention directly routes the telephone call from the caller to the closest service location in approximately 40 milliseconds using the AT&T telecommunications network. The system described by Riskin intercepts the call with a private switch, answers the call with a client recorded message and asks the caller to wait, while it takes approximately 15,000 milliseconds to find the closest service location and then call forwards the call to the service location.

To route a call, the system of the present invention looks up the caller's 10-digit telephone phone number in its 100,000,000 plus record Master Table, retrieves the spatial key that identifies the location of the caller's phone, looks up the spatial key in the 20,000,000 plus record Client Table, and retrieves the telephone number of the location that services the caller's spatial key or location. The system described by Riskin looks up the caller's 6-digit exchange in its 13,000 record Exchange file having only 2,500 unique coordinates, retrieves the V-H (vertical-horizontal) coordinates of the exchange, interleaves the V-H coordinates, and starts a binary-iterative, V-H key based, size search of the N record client service location database. The Riskin system iterates through this process, adjusting the size of the geographic areas searched, until it retrieves a number of service locations that fall within a predetermined range. Riskin then calculates the distance to each service location. If more than one location fits the criteria to be considered the closest distance, one location is randomly selected as the closest service location.

II. Routing Example

Prior to discussing the building of Client Tables in more detail, it will be helpful to first discuss use of this table and the Master Table in a "1-800" routing example. Referring to a central switch process **108** shown in FIG. **1c** and a routing network shown in FIG. **2**, an example of telephone call routing will now be given. In this example, a caller dials 1-800-Italian to order a "MyPizza" pizza from his phone (619-755-5666) located at 498 Stevens Avenue in Solana Beach, Calif. 92075-2064. Of course, the present invention is not limited to use of "800" telephone numbers as other numbers may be used in other embodiments.

FIG. **1C** includes process states and also data at **114**, **132**, and **146**, indicated by parallelogram blocks. Also, the central switch process is handled inside a switch as will be described below.

The steps involved in having this call automatically routed to the caller's local MyPizza Restaurant are as follows:

1. A caller at "Location A" **160** (FIG. 2), dials 1-800-Italian at block **110** (FIG. 1C) to order, for example, a pizza.

2. Based on the 1-800 dialed and the caller's long distance carrier, the call is routed by various telephone companies to an intelligent central switch in Jacksonville, Fla., indicated on FIG. **2** by "Location B" **162**. The process associated with the switch is shown in FIG. **1C** as being below the dotted line just before state **112** and above the dotted line just after state **148**. The central switch **111** is preferably a "4 ESS™" digital switch available from AT&T. The switch includes a general purpose computer (not shown) such as a network control point computer with a memory.

3. Once the Jacksonville switch has the call, it pulls the caller's telephone number from the calling information packet **114**, by call decoding hardware **112** which performs Automatic Number Identification (ANI). The preferred information packet **114** corresponds to the operation parameter field of the SS7 TCAP message available at the switch **111**. The hardware to perform ANI is described in U.S. Pat. No. 5,163,087 to Kaplan, and is hereby incorporated by reference. The number equivalent of 1-800-Italian is 1-800-482-5426, and the information packet looks as follows:

Packet . . . 6 37555666 . . . 18004825426 . . .

If the caller is using a non-Touch Tone telephone, the Caller ID or ANI is "000 000 0000". The "1-800" number is an

IN-WATS (inbound wide area telephone service) number and must be translated by a wide area carrier to a POTS (plain old telephone service) number to be routed to the switch **111**. Upon receiving the POTS number, the switch **111** translates the number back to the WATS format.

4. Then, at decision state **116**, the process **108** determines whether the client has chosen to give the caller an option to enter a telephone number on a Touch Tone telephone keypad or other means. In other embodiments, other characters are entered, such as a credit card number, an account number, or product order information, to enable other features of the system. In the presently preferred embodiment, the telephone number represents the location where the caller desires, for example, a product to be delivered or a service to be performed. As an example, if a client had a telephone number such as 800-FLORIST and desires the optional input feature, the caller could choose to have the flowers delivered to the address corresponding to a caller entered telephone number. If the decision state **116** is determined to be true, the process **108** moves to state **118** to capture the telephone number entered by the caller. This number is then used in place of the calling number in the information packet for further handling. However, if the decision state **116** is determined to be **false**, the original calling number is unchanged, and the process **108** moves to a decision state **120**.

5. At decision state **120**, the process **108** determines if the calling number in the information packet is that of a mobile telephone. A file in the computer of the switch **111** listing mobile telephone numbers is presently maintained by AT&T American Transtech and is updated on an as-needed basis. Mobile telephones are assigned a number from a set of prefixes unique to each area code in the U.S. Therefore the mobile telephone number file only needs to contain the area code and prefix combination (6 digits) to identify that the calling number is that of a mobile telephone. Because the mobile telephone user, as determined at decision state **120**, is not associated with a fixed location, the process **108** moves to a state **128** for handling non-routable exceptions. An operator will then request location information from the mobile telephone caller. Additional information about state **128** will be provided below. If the caller is not using a mobile telephone, the process **108** continues from state **120** to state **122**.

6. At state **122**, the process **108** looks up the caller's telephone number preferably using the well-known Indexed Sequential Access Method (ISAM) to index the Master Telephone Number to Zip+4 Table **107** (FIG. 1B). ISAM is a well known method of searching described in the book *Operating System Concepts* by Peterson and Silberschatz. Other searching techniques may be used in other embodiments. The Master Table **107** was described in the System Overview section. As an example, a segment of a Master Table **107** is shown in Table 1. This table is indexed by phone number and also contains the zip+4 code **132** of the physical address where the calling phone is physically located.

TABLE 1

Example Master Telephone Number to Zip+4 Table segment

	Phone #	Zip+4
	6197555654	920751111
	6197555665	920141313
▶	6197555666	920752064
	6197555668	920071234
	.	.
	.	.
	.	.

7. A test is performed at a decision state **126** to determine if the calling number is listed in the Master Table **107**. If not, the process **108** moves to state **128** wherein operator assistance is provided to route the call. The non-routable exception handling at state **128** is for situations wherein a Master Table **107** or Client Table (FIG. 1A) entry is missing, incorrect, or the caller is using a mobile telephone. In the presently preferred embodiment, operator assistance is provided by AT&T American Transtech. In general, only a small percentage of the calling numbers are not listed in the Master Table **107**. If the calling number is listed in the Master Table **107**, the process **108** advances to a decision state **130** to determine if there is a zip+4 code **132** corresponding to the calling number in the packet **114**. If not, the process **108** moves to state **128** wherein operator assistance is provided to route the call as mentioned previously. If a zip+4 code **132** is located in the Master Table **107**, the process **108** moves on to state **134**.

8. Since the information packet **114** also contains the number dialed, at state **134** the process **108** opens the Client Zip+4 to Service Location Table A **106***a* that is associated with the client having the telephone number 800-482-5426. The Client Table **106** is selected from a plurality of Client Tables based on the telephone number dialed by the caller. Client Table B **106***b* and additional tables, as necessary, are for other clients or other phone numbers, e.g., another "800" number, of the same client. The Client Tables are built by the assignee of the present invention, the client, or a third party to the assignee's specifications. There are two types of Client Tables. If calls are to be routed to the closest location or to a service location servicing a non-overlapping polygon trade area, the first type of Client Table contains only a single entry per zip+4 code with its corresponding service phone number **146** and distance. In cases where the client wants a random or weighted selection, from multiple selections, whose service areas service the caller or provide the caller a choice, the second type of Client Table can have multiple records per zip+4 code, with each record having a different service telephone number and distance. The process **108** looks up the caller's zip+4 code in the MyPizza Client Table **106***a* using the Indexed Sequential Access Method.

9. A test is performed at a decision state **140** to determine if the zip+4 code **132** is listed in the Client Table **106***a*. If not, the process **108** moves to state **128** wherein operator assistance is provided to route the call. If the zip+4 code is in the Client Table **106***a*, the process **108** proceeds to a decision state **142** to determine whether there is a client telephone listing for the zip+4 code **132**. If not, the process **108** moves to state **144** wherein operator assistance is provided to route the call, provide information, or take other action as determined by the client. A negative test result determined at state **142**, may arise, for example, if there is no service location within a client specified radius of the calling party. The exception handling at state **144** is for situations where the call is correctly routed, but the calling party does not get

TABLE 1-continued

Example Master Telephone Number to Zip+4 Table segment

what is expected, i.e., the call is not satisfactorily completed (as in states **142**, **152**, and **154**). In these situations, the client may select from a set of alternatives that can be handled by an automated process. An example exception handling message is as follows: "We are sorry, but there is currently no service location within your area. If you desire to talk to a representative, please press zero."

If there is a client telephone number associated with the zip+4 code **132**, the process **108** advances to state **148**. As an example, a segment of Client Table **106***a* is shown in Table 2.

TABLE 2

Example: 800-482-5426 Client Table segment

	ZIP+4	Phone #	Distance in miles
	.	.	.
	.	.	.
	.	.	.
	920752060	6199423366	3.1456
	920752062	6199423366	2.1682
>	920752064	6194817777	1.2864
	920752065	6197591111	0.1234
	.	.	.
	.	.	.
	.	.	.

10. After finding the caller's zip+4 code **132** and the corresponding service telephone number **146**, the switch, at state **148**, sends the information packet over the telephone network to ring at the telephone associated with the number 619-481-7777.

11. At block **150**, the telephone at MyPizza located at 2688 Via De La Valle in Del Mar, Calif. 92014-1909, "Location C" **164** (FIG. **2**), rings.

12. If the telephone at the client service location is "busy" **152** or there is "no answer" **154**, the process **108** proceeds to the exception handling state **144** as described previously. At the client's request, the exception handling at state **144** may, for instance, route the call to the next closest service location. Otherwise, if the "busy" or "no answer" conditions are false, the telephone call is answered and the caller may, for example, order a pizza.

III. General Client Table Build Process

The process **105** (FIG. **1***A*) of creating or building a Client Table **106** for each client or each "800" or similar number, for the client will now be described. This process is preferably performed on a general purpose computer, e.g., a personal computer. Such a personal computer preferably has at least an Intel 80486 class processor, at least 16 Megabytes (Mb) of memory, and has a minimum of one Gigabyte of mass storage. As previously mentioned, the present invention includes definitions for three different types of service area. A build process will be discussed for each type of service area definition. An example of the process steps will be given using a fictitious food service business.

The process for each type of service area definition utilizes four input files as shown in FIG. **1***A*. The zip+4 centroid file and zip windows file were briefly discussed in the System Overview section. Each input file is now further described. The following discussion again refers to FIG. **1***a*.

A. Client Service Locations File

The first file is a client service locations file **109** containing a list of service locations provided by the client. The service locations are defined by either a latitude/longitude location with a radius, or a latitude/longitude polygon, depending on the build process type. Further detail about file **109** is provided in conjunction with state **174** of FIG. **3** (radius) and state **604** of FIG. **12***A* (polygon).

B. Zip+4_Lat_Lon Centroid File

The second file is the zip+4 latitude and longitude centroid file **100** or zip+4_lat_lon centroid file previously described. This file is available from the U.S. Postal Service or from, for example, Geographic Data Technology, Inc. (GDT).

C. Zip Array File

The third file is a zip array file **103** created from the zip+4 latitude and longitude centroid file **100** and provides three benefits that improve processing efficiency.

The first benefit is building an array where the row number of the array is equal to a 5-digit zip code. This provides a very efficie it method of indexing to a 5-digit zip code where the 5-digit zip code number is the row number of the array.

The second benefit is once the 5-digit zip code is accessed in the array, the exact byte offset of where the first zip+4 code for this 5-digit zip code starts in the zip+4 latitude and longitude centroid file **100** is known. Using this method, it is very efficient to advance to the location of the first zip+4 record and read all the zip+4 records for a 5-digit zip code in the over 20 million record zip+4 latitude and longitude centroid file **100**.

The third benefit of the zip array file **103** is that for each five digit zip code, the file contains the latitude and longitude minimums and maximums for all the zip+4 codes in the 5-digit zip code. By checking to see if a radius or a polygon service area set of extremes overlap with the 5-digit zip code extremes, testing each zip+4 in a 5-digit zip code is eliminated, if it is determined beforehand that there is no spatial overlap between the zip+4 extremes in a 5-digit zip code and the radius or polygon service area.

The zip array file **103** is created using the GDT or Post Office supplied zip+4 latitude and longitude zip+4 centroid file **100**. Each record in the centroid file **100** contains a zip+4 number, and the latitude and longitude defined centroid for each zip+4. A four step, zip array file build process **101**, as follows, is used to create the zip array file **103**:

1.) A 32-bit integer array of 99,999 rows and 6 columns is initialized to zero. Column one is initialized to the row number which is then utilized as the 5-digit zip code.

2.) For a 5-digit zip code, every zip+4 record in the zip+4 latitude and longitude centroid file **100** is read in a sequential manner. The byte offset for the first zip+4 within the 5-digit zip code is noted. Temporary variables are initialized and then used to determine the latitude and longitude minimums and maximums of the zip+4 centroids for the current 5-digit zip code. The greatest and least of both the latitudes and longitudes among all zip+4 codes for the current 5-digit zip code are then passed on to the next step.

3.) With each change in 5-digit zip code, the byte offset for the first zip+4 within a 5-digit zip code and the latitude and longitude minimums and maximums for all zip+4 codes within a five digit zip code are written to memory for the previous 5-digit zip code to its location in the zip array file **103**. The latitude and longitude minimum and maximum values are then reinitialized, and the previous and current steps are repeated with the next 5-digit zip code until the end of the zip+4 centroid file **100** is reached.

4.) Upon reaching the end of the zip+4 centroid file **100**, the last 5-digit zip code record is written to memory, and then the zip array file stored in memory is written to a mass storage device such as a magnetic disk.

The column definitions for each row of the zip array file **103** are as follows:

column(1) is the 5-digit zip code number;
column(2) is the byte_offset into the zip+4_lat_lon centroid file **100** of the location of the lowest numbered zip+4 for the 5-digit zip code of that row;
column(3) is a minimum latitude for the zip code of that row (zip_lat_min);
column (4) is a maximum latitude (zip_lat_max);
column(5) is a minimum longitude (zip_lon_min); and
column(6) is a maximum longitude (zip_lon_max).

D. Zip Windows File

The fourth file is the zip_windows file **104**. The purpose of this file is to build a linkage between a latitude and longitude defined area on the earth and the zip codes that could theoretically touch this area. This linkage provides benefit by making spatial computer searches of postal geography much faster and much more efficient.

The zip_windows file **104** is created from the GDT or Post Office zip+4 latitude and longitude centroid file **100** using latitude and longitude, digitized polygon zip code boundaries. The general concept is to divide the earth into one tenth of one degree (0.1°) latitude and longitude rectangles, which, for example, are approximately 6.9 miles by 5.2 miles in dimension at 40° latitude, and then tabulate all zip codes that overlap each rectangle.

The zip_windows file **104** is created by a zip windows file build process **102** that reads each record from the over 20 million record zip+4 centroid file **100** and writes a corresponding record that contains a latitude and longitude (lat/lon) window and a 5-digit zip code. The lat/lon window field is created by multiplying the latitude in degrees times 10, taking the integer portion (INT) of the product, multiplying the integer portion by 10,000, and then adding the integer portion of the product of the longitude in degrees times 10.

For example, if the input zip+4 record is 920141909, the latitude is 32.9862 North and the longitude is 117.2522 West, the output zip_window record would be 3291172 for the lat/lon window and a zip code of 92014. After all records have been written to an initial or temporary zip_windows file (not shown), the file is then sorted by the lat/lon window value or key with the corresponding 5-digit zip code, and duplicate records are eliminated. The resultant final zip_windows file **104** is then written with each record composed of the lat/lon window key and the corresponding 5-digit zip code. Four lat/lon windows **210, 212, 214, 216**, corresponding respectively to zip window keys **3301172, 3301171, 3291172, 3291171**, are illustrated in FIG. **4**.

Now that the input files utilized by the Client Table build process have been described, each of the three different service area definition build processes will be described.

IV. Client Table Build Process for a Radius Defined Service Area

Referring generally to FIGS. **3** and **4**, a Client Table Process **170** for a radius defined service area will be described. Process **170** is a specific version of the client table build process **105** shown in FIG. **1A**.

The process **170** begins at a start state **172** and moves to state **174** wherein a client provides a client service locations file **109** (FIG. **1A**) of service locations in machine readable form with information and format as shown in Table 3. The file **109** can be created by, for example, a commonly available word processing program or a database program, and submitted on a floppy disk or other suitable media. Table 3 includes example information for a service location **218** named MyPizza Ristorante. The map of FIG. **4** illustrates some of the same information including a circle **220** to show a 2.5 mile radius from the MyPizza Ristorante as the service area.

TABLE 3

Record layout in ASCII Characters

Name of Service Location (30) Bytes	MyPizza Ristorante
Address (36) Bytes	2688 Via De La Valle
City (30) Bytes	Del Mar
State (2) Bytes	CA
Zip Code (9) Bytes	92014
Telephone # (10) Bytes	6194817777
Radius in tenths of miles (4) Bytes	25

Of course, other forms, information, and formats may be substituted in other embodiments.

The process **170** moves to state **176** wherein the list of service locations in file **109** is address standardized, zip+4 coded, and latitude and longitude geocoded using commercially available services through companies such as Group I and Geographic Data Technology. Table 4 is an example of a standardized record with latitude and longitude appended.

TABLE 4

Name of Service Location (30) Bytes	MYPIZZA RISTORANTE
Address (36) Bytes	2688 VIA DE LA VALLE
City (30) Bytes	DEL MAR
State (2) Bytes	CA
Zip Code (9) Bytes	920141909
Telephone # (10) Bytes	6194817777
Radius in tenths of miles (4) Bytes	25
Latitude in degrees (10) Bytes	32.9862
Longitude in degrees (12) Bytes	-117.2522

Moving to state **178**, the process **170** establishes the constant of 68.9404 miles per degree latitude and reads the zip array file **103** (FIG. **1A**) into memory of the computer. At state **180**, the process **170** reads a record from the file of service location records and calculates the number of miles per degree longitude for the service location. The miles per degree longitude=68.9404*COSINE(latitude). For the example given in Table 4, at 32.9862 degrees latitude, the result is 57.8297 miles per degree longitude.

The process **170** proceeds to a function **182** which creates a list of zip windows that the service location touches. Touching a zip window means that at least part of the service area is in or overlaps the zip window. The zip windows **210, 212, 214, 216** for the example given in Table 4 are illustrated in FIG. **4**. The function **182** will be further described in conjunction with FIG. **5** hereinbelow.

Moving to a function **184**, the process **170** generates a list of 5-digit zip codes that touch any of the zip windows identified by function **182**. This zip list is sorted in ascending order and duplicate zip codes are removed in the function **184**. The function **184** will be further described in conjunction with FIG. **7** hereinbelow.

The process **170** proceeds to a function **186** wherein 5-digit zip codes that are not within the service location site radius specified in state **174** are removed from the zip list generated by function **184**, and a zip final list is created. The function **186** will be further described in conjunction with FIG. **9** hereinbelow.

Advancing to function **188**, the process **170** retrieves all the zip+4 records corresponding to the zip codes in the zip final list (generated by function **186**), used in conjunction with a zip pointer list (also generated by function **186**), and determines if the zip+4 is at or inside the service area radius. This determination also yields the distance from the service

location to the zip+4 centroid (recalling that the zip+4 centroids are stored in the zip+4 centroid file **100**). If the zip+4 is determined to be at or inside the service area radius, a raw Client Table record is written that includes the zip+4 code, the client telephone number for the instant service location, and the distance of the zip+4 centroid to the service location. The function **188** will be further described in conjunction with FIG. **10** hereinbelow.

The process **170** moves to a decision state **190** to determine if additional client service records are to be processed. If so, the loop of states **180** to **188** is repeated for the next service location record. If all service location records have been processed for the instant Client Table, the process **170** advances to state **192**. At state **192**, the process **170** sorts the raw records, written by function **188**, by ascending zip+4 code and then by descending distance if the same zip+4 code is listed more than once. The same zip+4 code could be listed more than once if there are multiple service locations, each with a different client telephone number, within the client specified, radius defined service area.

Up to decision state **194**, the process for building a Client Table **106** is identical for both the radius defined service area and for the service location closest to the caller within a distance limit.

At decision state **194**, if the client selects the service location closest to the caller, the process **170** moves to a function **196** to finish the Client Table build process. The function **196** will be further described in conjunction with FIG. **11** hereinbelow.

If the client selects the radius defined service area at decision state **194**, the process **170** moves to a state **198** wherein the sorted Client Table from state **192** is loaded into the computer in the telephone network switch **111** (FIG. **1C**), and an index key on the zip+4 codes is built. Upon completion of either function **196** or state **198**, the Client Table build process ends at state **200**.

Referring generally to FIG. **5**, the function **182** defined in FIG. **3** will be described. Function **182** generates a list of zip windows that the site touches by first calculating site latitude and longitude extremes. For this calculation, the absolute value is used for both the latitude and longitude.

In another embodiment of the present invention, a prefix is assigned to the window key based on the sign of the latitude or longitude. The United States is located in the Northwest quadrant, and the key for this quadrant is zero(0). A leading zero has no impact on the value of the numeric key. The other quadrants are Northeast, east of the prime meridian at Greenwich, England in the Northern hemisphere; Southwest, west of the prime meridian in the Southern hemisphere; and Southeast, east of the prime meridian in the Southern hemisphere.

Since almost all countries of the world are only in one quadrant, using the absolute value of the latitude and longitude works well. In the few countries that are exceptions (that are in two quadrants), a different coordinate system may be used, e.g., the Ordinance Survey system used in the United Kingdom.

Beginning at a start state **252** shown in FIG. **5**, the process **170** moves to a state **254** to calculate latitude extremes of the service area. Several abbreviations will be used hereinforward: "min" for minimum, "max" for maximum, "lat" for latitude, and "lon" for longitude.

Site_lat_min=site_lat−radius(miles)/miles per degree lat;

Site_lat_max=site_lat+radius(miles)/miles per degree lat.

Computation for the example service location and radius given in Table 4 yields:

Site_lat_min=32.9862−2.5/68.9404=32.9499;

Site_lat_max=32.9862+2.5/68.9404=33.0228.

The process continues at state **256** wherein longitude extremes of the service area are calculated:

Site_lon_min=site_lon−radius(miles)/miles per degree lon;

Site_lon_max=site_lon+radius(miles)/miles per degree lon.

Computation for the example service location and radius given in Table 4 yields:

Site_lon_min=117.2522−2.5/57.8297=117.2089;

Site_lon_max=117.2522+2.5/57.8297=117.2954.

Moving to states **258** and **260**, the process **170** builds values for zip window minimum and maximum based on the site latitude and longitude, respectively. Computation using the above example and results yields:

Site_lat_window_min=lat(10*site_lat_min)=329;

Site_lat_window_max=lat(10*site_lat_max)=330;

Site_lon_window_min=lat(10*site_lon_min)=1172;

Site_lon_window_min=lat(10*site_lon_max)=1172.

Moving to a function **262**, the process **170** generates zip windows based on latitude min and max values, and longitude min and max values and stores them in a zip_windows_list, which is distinct from the zip_windows file **104** (FIG. **1A**). Function **262** will be further described below in conjunction with FIG. **6**. The function **182** returns at state **264** to FIG. **3**.

Referring to FIG. **6**, the function **262** defined in FIG. **5** will be described. Function **262** builds the actual zip_window_list for the service location. The function begins at a start state **270** and moves to state **272** wherein the variable I is set to equal zero (0), and the variable J is set to equal the value for the site latitude window minimum. After the initialization of state **272**, the process **170** moves to state **274** wherein the variable K is set equal to the value for the site longitude window minimum. Moving to state **276**, the value of variable I is incremented by one.

At state **278**, a value of the zip_window_list, identified or addressed by the value of variable I, is calculated as the value of the variable J multiplied by 10000 and then adding the value of variable K. State **280** determines whether the value of K has reached the maximum value, and if not, the value of K is incremented by one (1) at state **282**, and a loop to state **276** is performed. If K has reached the maximum site longitude value, the process **170** continues at state **284** to determine whether the value of J has reached the maximum value, and if not, the value of J is incremented by one (1) at state **286**, and a loop to state **274** is performed. If J has reached the maximum site latitude value, the function **262** returns at state **288** to FIG. **5**.

Continuing the example given in conjunction with FIG. **5**, the result of function **262** is as follows:

Zip_window_list(1)=3291172

Zip_window_list(2)=3301172

Referring to FIG. **7**, the function **184** defined in FIG. **3** will be described. Function **184** generates a list of 5-digit zip codes touching the zip windows identified by function **18**

(FIG. 5). Beginning at a start state **300**, the process **170** moves to a state **302** and retrieves the zip_windows file **104** (FIG. 1A) previously described and the zip_window_list from function **182**. The zip_windows file **104** is indexed by the zip_window key and contains a list of all zip codes that touch the zip window. A sample of the zip_windows file **104** is given in Table 5, which corresponds with FIG. 4.

TABLE 5

Window	Zip_code
.	.
.	.
3291172	92014
3291172	92075
3291172	92130
.	.
.	.
3301172	92007
3301172	92014
3301172	92024
3301172	92029
3301172	92075
.	.
.	.
.	.

Continuing at state **304**, the process **170** initializes the variable K to the value of zero (0) and the variable J to the value of one (1). Then at state **306**, the process **170** advances to the record in the zip_windows file **104** having the key equivalent to the value of the zip_window_list addressed by the variable J. At state **308**, the record accessed at state **306** is read to get the zip_window and the associated zip code. Moving to state **310**, the variable K is incremented by one (1), followed by state **312** wherein zip code read at state **308** is written to a zip_list addressed by the variable K. A check is then made at a decision state **314** to determine if the value of the zip_window from state **308** is greater than the value of the zip_window_list addressed by the variable J. If not, the next record in the zip_windows file **104** is read by looping back to state **308**.

If the decision state **314** test is true, the process moves to a decision state **316** to determine if the value of J is equivalent to the number of windows in the zip_window_list. If not, the value of J is incremented by one (1) and a loop back to state **306** is performed to process the next window. If the decision state **316** is true, all windows in the zip_window_list have been processed, and the function **184** continues at state **320** wherein the zip_list of 5-digit zip codes is sorted in ascending order. For the continuing example, after state **320**, the zip_list appears as follows:

92007
92014
92014
92024
92029
92075
92075
92130

Moving to a function **322**, the process **170** removes duplicate entries in the zip_list to generate a deduped_zip_list. Function **322** will be further described in conjunction with FIG. **8** below. The function **184** returns at state **324** to FIG. **3**.

Referring to FIG. **8**, the function **322** defined in FIG. **7** will be described. Function **322** removes duplicate 5-digit zip codes from the zip_list as sorted in state **320** of FIG. **7**. Beginning at a start state **340**, the process **170** moves to a state **342**, and the first entry of zip_list is defined to be the first entry of a deduped_zip_list. Proceeding to state **344**, a variable L is assigned the value of one (1) and a variable J is assigned the value of two (2). Then at a decision state **346**, the process **170** determines whether the value of zip_list addressed by J is equivalent to the value of zip_list addressed by "J minus one". If not, variable L is incremented by one at state **348**, and the next entry in deduped_zip_list as addressed by L is written to be equivalent to the entry in the zip_list as addressed by J.

If the decision state **346** is false or at the completion of state **350**, the process **170** moves to a decision state **352** to determine if the value of variable J is equal to the number of zip codes in the zip_list. If not, variable J is incremented by one at state **354**, and the process **170** loops back to state **346** to check the next entry in zip_list. However, if all zip codes in zip_list are checked, as determined by state **352**, the function **322** returns at state **356** to FIG. **7**. For the continuing example, the deduped_zip_list at the completion of function **322** is as follows:

92007
92014
92024
92029
92075
92130

Referring to FIG. **9**, the function **186** defined in FIG. **3** will be described. Function **186** builds a zip_final list and a zip_pointer list by checking zip boundary extremes and getting an offset to the start of the zip+4_lat_lon centroid file **100** (FIG. 1A) from the zip array file **103**. This procedure eliminates zip codes that do not touch the area covered by the radius of the service area. Beginning at a start state **370**, the process **170** moves to a state **372** and accesses the zip array file **103** (FIG. 1A). Function **186** utilizes all columns, as previously described, of the zip array file **103** (FIG. 1A). Moving to state **374**, variable I is set to a value of zero, and variable J is set to a value of one. Proceeding to state **376**, variable M is set equivalent to the entry in deduped_zip_list, from function **184**, addressed by J.

Using the site information calculated in Function **182** and the information from the zip array table, a series of checks are performed by decision states **378** to **384**. At decision state **378**, the process **170** determines whether the site_lat_max is less than the zip_lat_min for the zip array file entry addressed by the variable M. If so, the process **170** moves to a decision state **386**. If not, the process continues at decision state **380**. At decision state **380**, the process **170** determines whether the site_lat_min is greater than the zip_lat_max for the zip array file entry addressed by the variable M. If so, the process **170** moves to decision state **386**. If not, the process continues at decision state **382**.

At decision state **382**, the process **170** determines whether the site_lon_max is less than the zip_lon_min for the zip array file entry addressed by the variable M. If so, the process **170** moves to decision state **386**. If not, the process continues at decision state **384**. At decision state **384**, the process **170** determines whether the site_lon_min is greater than the zip_lon_max for the zip array file entry addressed by the variable M. If so, the process **170** moves to decision state **386**. If not, the process continues at state **392**. To get to state **392**, a determination has been made that the zip code does touch the area covered by the radius of the site. At state **392**, variable I is incremented by one, and at state **394**, the process **170** writes the value of M to the zip_final list entry addressed by I. Moving to state **396**, the process **170** writes the value of byte_offset from the zip array file entry addressed by the variable M to the zip_pointer list entry addressed by I, and the process moves to state **386**.

If any of the decision states **378** to **384** is true, the current zip code entry from deduped_zip_list is not further used. At decision state **386**, a determination is made whether all entries in the deduped_zip_list have been checked. If not, J is incremented by one at state **388**, and the process **170** loops back to state **376** to check the next entry. If all entries have been checked as determined by state **386**, the function **186** returns at state **398** to FIG. **3**. For the continuing example, the zip_final list at the completion of function **186** is as follows:

92007
92014
92075
92130

Referring to FIG. **10**, the function **188** defined in FIG. **3** will be described. Function **188** reads all zip+4 records as identified by the combination of the zip_final list and zip_pointer list, and determines if the zip+4 centroids are inside the site radius. Beginning at a start state **420**, the process **170** moves to a state **422** and gets the zip_final list, the zip_pointer list, and the zip+4 centroid file **100**. At state **424**, variable J is set to a value of one. Moving to state **426**, the process **170** advances in the zip+4 centroid file to the address contained in the zip_pointer list addressed by the variable J. Then, at state **428**, the zip+4 latitude/longitude record is read at the address from state **426**. The zip+4 centroid file **100** (FIG. **1A**) is sorted in ascending zip+4 order, and each record in this file contains three fields: zip+4 code, latitude in degrees, and longitude in degrees. Moving to state **430**, the process **170** calculates the distance from the service location to the zip+4 centroid. The site latitude and longitude are available from state **176** while the zip+4 latitude and longitude are available from state **428**. Moving to state **432**, the process **170** determines if the distance squared from state **430** is greater than the radius squared (which is available from state **174**). If not, the zip+4 code is inside the site radius, and the process **170** moves to state **434** to write a raw client table zip+4 telephone number record. This record contains the zip+4 code, the telephone number of the client service location, and the square root of the distance squared.

If the distance squared is greater than the radius squared, the zip+4 code is outside the site radius, and the process moves to a decision state **436**. At state **436**, the process **170** determines if the current zip+4 code is greater than 10000 times the value of the zip_final list entry addressed by the variable J plus 9999. The current zip+4 is compared to a value for the highest possible numbered zip+4 for the current zip code by appending 9999 to the 5-digit zip code. For example, if the zip code is 92007, the highest possible number for a zip+4 for this zip code is 920079999. While reading the zip+4 records for zip code 92007, if the zip+4 record read is greater than 920079999, then the end of zip+4 records for the 92007 zip code is passed, and the process **170** moves to the next zip code in the zip_final list. If the decision state **436** is false, the process **170** moves to state **438** and advances to the next zip+4 record for the same 5-digit zip code in the zip+4 centroid file **100**. The next record is read by looping back to state **428**.

If decision state **436** is true, the process **170** moves to a decision state **440** to determine if all records in the zip_final list have been read. If not, the variable J is incremented by one at state **442**, and the process loops back to state **426** and repeats the procedure for the next 5-digit zip code in the zip_final list. If all 5-digit zip codes have been processed as determined by state **440**, the function **188** returns at state 444 to FIG. **3**. For the continuing example, a sample record of the raw Client table at the completion of state **434** is as follows:

Sample record: 920752064 6194817777 1 2865.

V. Client Table Build Process for the Service Location Closest to the Caller Within a Distance Limit

The "closest" process is identical to the process for building a Client Table **106** for a radius defined service area with the exception of the last step. For the "closest" process, function **196**, as shown in FIG. **3**, is used instead of state **198**. The radius defined service area can result in a zip+4 code assigned to more than one service area. However, there can only be one closest service area.

States **172** to **194** in the radius defined service area process are identical for the "closest" process. Referring to FIG. **11**, function **196** as defined in FIG. **3** will be described. Function **196** removes multiple assignments of a zip+4 code and keeps the one with the shortest distance. Beginning at a start state **500**, function **196** accesses the sorted intermediate Client Table (not shown) which is available at the completion of state **192**. Moving to state **504**, a variable "last_zip+4" is set equal to the value of zero. Then, at state **506**, beginning with the first record, a record is read from the intermediate Client Table. Moving to a decision state **508**, a determination is made whether the zip+4 just read in the record from state **506** is equivalent to the value of last_zip+4. If not, the current record is written to the Client Table **106** at state **510**, followed by setting the variable last_zip+4 equivalent to the current zip+4 code at state **512**.

At the completion of state **512**, a decision state **514** determines if the end of the sorted intermediate Client Table has been reached. If not, the function **196** advances to the next zip+4 code in the intermediate Client Table and loops back to state **506** to process the next record. If the end of the intermediate Client Table has been reached as determined by state **514**, the Client Table **106** is loaded in the computer of the telephone switch **111** and an index key on the zip+4 code is built. Function **196** returns at state **520** to state **200** of FIG. **3** to end the "closest" process.

VI. Client Table Build Process for a Polygon Defined Service Area

In general, there are two types of polygon defined service areas. The first type is an exclusive or non-overlapping trade area, and the second type is a non-exclusive or overlapping trade area.

For a non-overlapping polygon defined service area, each franchisee has a defined trade area, such as the area in which they deliver a product. The following situation is given to illustrate this concept. A customer could be located closer to, say, Franchisee B than Franchisee A, but if the customer is in the polygon area for Franchisee A, only the telephone number for Franchisee A will be in the Client Table **106** (FIG. **1A**) record corresponding to the location of the customer. However, if the service areas for Franchisee A and Franchisee B are overlapping, the Client Table **106** would have one record with the telephone number and distance for Franchisee A, and another record with the telephone number and distance for Franchisee B. Therefore, the client table build process **105** accommodates both types of polygon defined service areas.

Referring generally to FIGS. **12A**, **12B**, and **13**, a Client Table process **600** for a polygon defined service area will be described. Process **600** is another specific version of the general process **105** shown in FIG. **1A**. Many parts of the polygon defined service area process **600** (also referred to as the polygon process) are identical with those of the radius defined service area process **170**. Some functions have

minor changes. Other functions are totally different. For functions that are almost identical only the differences will be identified and explained to avoid repetition. The new functions will be described in some detail.

The process **600** begins at a start state **602** and moves to state **604** wherein a client provides a client service locations file **109** (FIG. 1A) of service locations in machine readable form with information and format as previously shown in Table 3. The client also provides a detailed street map with the polygon service area of the service location drawn on the street map with the telephone number of the service location written inside the polygon service area. The map of FIG. **13** illustrates an example polygon service area **640**.

The process **600** moves to state **606** wherein the list of service locations in file **109** is address standardized, zip+4 coded, and latitude and longitude geocoded using commercially available services through companies such as Group I and Geographic Data Technology. Table 4 is the example of a standardized record with latitude and longitude appended. In addition, the latitude and longitude vertices for the polygon service area drawn on the street map are digitized using a commercially available GIS system such as Infomark for Windows available from Equifax National Decision Systems. The digitizing process of state **606** assigns latitude and longitude coordinates for the vertices of the polygon and creates a polygon file **607** as shown in FIG. **12B**. An example of the polygon file **607** is shown in Table 6 with the following data items:

TABLE 6

Geocode:	6194817777
Name:	MyPizza Del Mar
Number of vertices:	5
Lat/Lon vertex pairs:	33.0170–117.2910
	32.9503–117.2874
	32.9623–117.2132
	33.0187–117.2084
	33.0170–117.2910

The last latitude/longitude vertex pair must equal the first pair to close the polygon. This example is for a very simple polygon. Typical franchise polygons are very complex; the polygon may follow non-linear street boundaries and contain hundreds of vertices. The geocode is the telephone number of the service location.

Moving to state **608**, the process **600** establishes the constant of 68.9404 miles per degree latitude and reads the zip array file **103** (FIG. 1A) into memory of the computer. At state **610**, the process **600** reads a record from the client service location file **109** and calculates the number of miles per degree longitude for the service location. The miles per degree longitude=68.9404*COSINE(latitude). For the example given in Table 4, at 32.9862 degrees latitude the result is 57.8297 miles per degree longitude.

The process **600** proceeds to a function **612** which generates a list of zip windows that the service location touches. Touching a zip window means that at least part of the service area is in or overlaps the zip window. The zip windows for the example given in Table 4 are illustrated in FIG. **13**. The function **612** will be further described in conjunction with FIG. **14** hereinbelow.

Moving to a function **614**, the process **600** generates a list of 5-digit zip codes that touch any of the zip windows identified by function **612**. This zip list is sorted in ascending order and duplicate zip codes are removed in function **614**. The function **614** will be further described in conjunction with FIG. **16** hereinbelow.

The process **600** proceeds to a function **616** wherein 5-digit zip codes that are not within the polygon service area specified in state **604** are removed from the zip list generated by function **614**, and a zip final list is created. The function **616** will be further described in conjunction with FIG. **18** hereinbelow.

Advancing to function **618**, the process **600** builds a line index file **619** shown in FIG. **12B** of discrete latitude and longitude points that define the polygon. Function **618** will be further described in conjunction with FIGS. **19A** and **19B** hereinbelow.

Continuing to function **620**, the process **600** retrieves all the zip+4 records corresponding to the zip codes in the zip final list generated by function **616** and determines if the zip+4 code is at or inside the polygon service area. If so, a record is written in a raw Client Table (not shown) that includes the zip+4 code, the client telephone number for the instant service location, and the distance of the zip+4 centroid to the service location. The function **620** will be further described in conjunction with FIG. **20** hereinbelow.

The process **600** moves to a decision state **622** to determine if additional client service records are to be processed. If so, the loop of states **610** to **620** is repeated for the next service location record. If all service location records have been processed for the instant raw Client Table, the process **600** advances to state **624**. At state **624**, the process **600** sorts the raw records, written by function **620**, by ascending zip+4 code and then by descending distance, if the same zip+4 code is listed more than once. The same zip+4 code could be listed more than once if there are multiple overlapping polygon service locations, each with a different client telephone number.

The process **600** then moves to a state **626** wherein the sorted Client Table from state **624** is loaded onto the computer of the telephone network switch **111**, and an index key on the zip+4 codes is built. Upon completion of state **626**, the Client Table build process **600** for a polygon defined service area ends at state **628**.

Referring generally to FIG. **14**, the function **612** defined in FIG. **12A** will be described. Function **612** generates a list of zip windows that the site touches by first calculating site latitude and longitude extremes. For this function, the absolute value is used for both the latitude and longitude.

Beginning at a start state **670**, the process **600** moves to a state **672** to establish latitude extremes of the service area. The polygon file **607** is accessed to retrieve the polygon vertices latitude minimum and maximum values.

```
Site_lat_min=polygon_lat_min;

Site_lat_max=polygon_lat_max.
```

For the example service location and polygon given in Table 6, the results are as follows:

```
Site_lat_min=32.9503;

Site_lat_max=33.0187.
```

The process continues at state **674** wherein longitude extremes of the service area are established. The polygon vertices longitude minimum and maximum values are retrieved from the polygon file **607**.

```
Site_lon_min=polygon_lon_min;

Site_lon_max=polygon_lon_max.
```

For the example service location and polygon given in Table 6, the results are as follows:

```
Site_lon_min=117.2084;
```

Site_lon_max=117.2910.

States **676** and **678** are identical to states **258** and **260** of function **182** (FIG. **5**). As defined in FIG. **14**, function **680** (FIG. **15**) is identical to function **262** (FIG. **6**). Function **612** returns at state **682** to FIG. **12A**.

As defined in FIG. **12a**, function **614** (FIG. **16**) is identical to function **184** (FIG. **7**). As defined in FIG. **16**, function **752** (FIG. **17**) is identical to function **322** (FIG. **8**). As defined in FIG. **12A**, function **616** (FIG. **18**) is identical to function **186** (FIG. **9**).

Referring to FIGS. **19A** and **19B**, the function **618** defined in FIG. **12A** will be described. Function **618** builds the line index file **619** by rounding all modified polygon vertices latitudes and longitudes to an integer value, thereby creating a record of every discrete point along the line generated by connecting adjacent vertices listed in the polygon file **607**. The modification performed to the polygon vertices is subtracting the site_lat_min or site_lon_min as will be seen below.

Beginning at a start state **830**, the process **600** moves to a state **832** and initializes a variable J to equal the value one. Moving to state **834**, the process **600** initializes a tangent (denoted by "T" in FIG. **19**) array element addressed by the variable J to equal the value zero. At state **836**, a latitude array (denoted by "LAT" in FIG. **19**) element addressed by J is written to the value calculated by: subtracting site_lat_min (available from function **612**, FIG. **14**) from the vertices latitude (lat_vertices) addressed by J in the polygon file **607** (available from state **606**), multiplying the result by 10,000, and then taking the integer (INT) portion of the product. Advancing to state **838**, a longitude array (denoted by "LON" in FIG. **19**) element addressed by J is written to the value calculated by: subtracting site_lon_min (available from function **612**, FIG. **14**) from the vertices longitude (lon_vertices) addressed by J in the polygon file **607** (available from state **606**), multiplying the result by 10,000, and then taking the integer portion of the product.

At a decision state **840**, the process **600** determines if all vertices in the polygon file **607** have been processed. The number of vertices is available from state **606** as shown in the example in Table 6. If not, variable J is incremented by one at state **842**, and the process **600** loops back to state **834** to process the next vertices. If all vertices have been processed, variable J is set equal to the value two at state **844**.

States **846** through **860** are used to find vertices that are tangent to a latitude line. States **846** through **854** form a loop to sequence through all elements of the LAT array to determine if either of the conditions of decision states **846** or **850** are met. If so, the element of the tangent array addressed by J is set equal to one. If not, the next element is checked, by incrementing J at state **854** and looping back to state **846**, until the end of the LAT array is reached, i.e., all vertices are tested, and decision state **852** is true. Decision state **846** determines whether the values of the elements of array LAT immediately before and immediately after the current element are greater than the value of the current element. In other words, decision state **846** determines whether a latitude line is tangent to vertex(J). Decision state **850** determines whether the values of the elements of array LAT immediately before and immediately after the current element are less than the value of the current element. In other words, decision state **850** determines whether a latitude line is tangent to vertex(J).

When J equals the number of vertices minus one, the process **600** moves to states **856** through **860** to perform the follow tests:

decision state 856: If LAT(1)>LAT(2) AND LAT(1)> LAT(number_vertices-1) then T(J)=1;

decision state 860: If LAT(1)<LAT(2) AND LAT(1)< LAT(number_vertices-1) then T(J)=1.

Number_vertices is used to represent the number of vertices as available from state **606**. Decision states **856** through **860** test for a special case of previous states **846** through **854** to determine if vertex(1) is tangent to a latitude line. If so, the element of the tangent array addressed by J is set equal to one.

At state **862**, the process **600** sets variable J equal to one. Block **864** is an off page connector from FIG. **19A** to FIG. **19B**. Continuing on from block **864** on FIG. **19B**, the process **600** generates a pseudo-line of discrete latitude points connecting the polygon vertices. Each point that defines the line is described by an X,Y coordinate. Each Y coordinate or latitude point is one ten-thousandth of a degree latitude apart on the Y axis.

Decision state **866** checks for parallel latitude lines, and if true, the process **600** moves to decision state **886** to determine if all vertices have been processed. If not, J is incremented by one at state **888**, and the process loops back to decision state **866** to check the next element of array LAT. If LAT(J) does not equal LAT(J+1) as determined by decision state **866**, the process **600** moves to state **868**, sets a variable K to equal the value of LAT(J), and moves to state **870**.

State **870** is used to leave out latitude tangent vertices points. State **870** determines if K is equivalent to LAT(J) and T(J) equals one. If so, the process **600** moves to decision state **882** to determine if K should be incremented by one at state **884**, or if K has reached the value "LAT(J+1)−1" and decision state **886** is to be performed. If K is incremented at state **884**, the process **600** loops back to decision state **870**.

If decision state **870** is false, the process **600** moves to state **872** to calculate a variable "delta_lat" to be "LAT(J)−LAT(J+1)". At state **874**, a variable "delta_lon" is calculated as the difference between the value of the array LON element addressed by J and the value of the array LON element addressed by J plus one. Moving to state **876**, a variable "lat_point" is set equivalent to the value of variable K. State **878** is used to calculate a longitude (variable "lon_point") for latitude line point using the following equation:

$$lon_point=INT((K-LAT(J)/delta_lat)*delta_lon+LON(J)).$$

Moving to state **880**, the process **600** writes the values of lat_point and lon_point to the line index file and then loops back to decision state **882** to check on the value of K.

At decision state **886**, if J equals the number of vertices minus one, all vertices have been processed, and the process **600** moves to state **890**. At state **890**, the process **600** sorts the line index file by ascending latitude point, and then by ascending longitude point within the latitude point. Moving to state **894**, process **600** builds the polygon line index file **619** using the latitude point as the indexing key. Function **618** returns at state **894** to FIG. **12A**.

Referring to FIG. **20**, the function **620** defined in FIG. **12A** will be described. Function **620** reads all zip+4 records as identified by the combination of the zip_final list and zip_pointer list, and determines if the zip+4 centroids are inside the polygon service area.

Beginning at a start state **910**, the states **912** through **918** are identical to states **422** through **428** of function **188** (FIG. **10**). Then beginning at state **920** through state **926**, the process **600** compares the latitude and longitude of the zip+4

centroid to the minimums and maximums of the site latitude and longitude available from function **612** (FIG. **14**). In other words, the process **600** determines if the zip+4 centroid is inside the latitude and longitude extremes of the polygon service area. If not, at state **928** the process **600** advances to point to the next zip+4 record and then loops back to state **918** to read the zip+4 record.

However, if the zip+4 centroid is determined to be inside the latitude and longitude extremes of the polygon service area by states **920** through **926**, the process **600** moves a function **930**. Function **930** is a final test to determine if the zip+4 centroid is indeed inside the polygon. The point-in-polygon test of function **930** returns with either an "inside" flag or "outside" flag. If the zip+4 centroid is not inside the polygon, the "outside" flag is set by function **930**, and the process **600** moves to state **928** to advance to the next zip+4 record. However, if the zip+4 centroid is inside the polygon, the "inside" flag is set by function **930**, and the process **600** moves to state **932** to perform a distance calculation. State **932** is identical to state **430** of function **188** (FIG. **10**). States **934** through **940** and **928** are identical to states **434** through **442** of function **188**. Function **620** returns at state **942** to FIG. **12A**.

Referring to FIG. **21**, the function **930** defined in FIG. **20** will be described. Function **930** tests to determine if the zip+4 centroid is inside the polygon. Function **930** conceptually draws a line from the zip+4 latitude in a negative longitude direction and then counts the number of times the line crosses the polygon boundary. If the line crosses an odd number of times, the zip+4 centroid is inside the polygon, but an even number of line crossings determines that the zip+4 centroid is outside the polygon.

Beginning at a start state **960**, the process **600** moves to state **962** to calculate a value for a variable "lat" by: subtracting site_lat_min (available from function **612**, FIG. **14**) from zip+4_lat (available from the zip+4 centroid file **100**), multiplying the result by 10,000, and then taking the integer (INT) portion of the product. Moving to state **964**, the process **600** calculates a value for a variable "lon" by: subtracting site_lon_min (available from function **612**) from zip+4_lon (available from the zip+4 centroid file **100**), multiplying the result by 10,000, and then taking the integer portion of the product.

Moving to state **966**, the process **600** initializes the variable "count" to a value of zero and proceeds to state **968** to access the line index file **619**. At state **970**, the process **600** reads the polygon line index file **619** (available from function **618**, FIG. **19A**) to retrieve the values for the variables "lat_point" and "lon_point". The process **600** advances in the polygon line index file **619** to the first occurrence of "lat" in the file by use of the file ISAM index. Moving to a decision state **972**, the process **600** determines if "lat_point" is greater than "lat". If "lat_point" is greater than "lat" then all records in the polygon line index file **619** have been read. If not, a test is performed at a decision state **974** to determine if "lon_point" is less than "lon". If "lon_point" is less than "lon", a line drawn from the zip+4 centroid toward negative infinity is defined to cross a polygon line. At state **976**, "count" is incremented by one to indicate the line crossing exists, and the process **600** loops back to state **970**. However, if decision state **974** is false, the process **600** loops back to state **970** to perform the next read of the line index file **619**.

If process **600** determines at decision state **972** that "lat_point" is greater than "lat", process **600** moves to a decision state **978** to check if "count MODULUS 2" is equal to zero. If so, an even number of line crossings exist, the "outside" flag is then set, and the function **930** returns at state **980** to FIG. **20**. If decision state **978** is false, i.e., "count MODULUS 2" is not equal to zero, an odd number of line crossings exist which denotes that the zip+4 centroid is inside the polygon. The process **600** sets the "inside" flag, and the function **930** returns at state **982** to FIG. **20**.

VII. Summary

The present invention utilizes ANI information as an index to a table containing partitions of a country into small geographic areas, such as postal service zip+4 codes. These partitions are further utilized to access one of a plurality of service locations that may be anywhere within the country.

The automated telephone routing system of the present invention provides the ability to reduce costs by routing a very high percentage of calls made to a single national telephone number without any human intervention and the marketing advantage for a client of a single, easy to remember, toll free or nominal fee national telephone number. The system also provides geographically precise results due to the use of all ten digits of the calling and called telephone numbers which correspond with the zip+4 codes for the locations of these numbers. The automated routing system provides the ability for a business to choose among different types of destination service area definitions. Preferably, these service area definitions include the closest service location to the caller within a predefined distance; all service locations within a specific radius of the caller; and a service location whose service area is defined as an irregular shaped polygon that may or may not overlap with any other polygons.

The present invention provides a method of routing all published and unpublished telephone numbers, including unlisted numbers, secondary unpublished business lines, and public pay phones without any violation of federal, state and local laws. The present invention also provides a method for legally conforming to contracted franchise territory definitions executed between franchisers and franchisees by routing customer's calls precisely to the correct legal franchisee area. Additionally, the present invention provides a method for precisely routing telephone calls based on any geographic definition including postal geography, census geography, telecommunications geography, special grid coordinate geography, and all custom geography.

The present invention provides a method for automatically routing and processing customer calls that do not meet the pre-set client protocols. This "exceptions handling" process routes to a "live" operator who executes preset exceptions handling protocols. The present invention also provides for a method of integrating unrelated geographic information systems and database technology, telecommunications systems and database technology, postal systems and database technology, and computer technology into a common applications driven architecture. Additionally, the present invention provides a method for dynamically and instantaneously updating and integrating Client and Master Tables with no time lags. Furthermore, the present invention provides a method for automating the processing of information that is input by a customer using a customer interface that automatically routes telephone calls to customer requested destinations.

While the above detailed description has shown, described, and pointed out the fundamental novel features of the invention as applied to various embodiments, it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated may be made by those skilled in the art, without departing from the spirit of the invention.

What is claimed is:

1. In a telecommunications network, an automated call processing system, comprising:

means for receiving a telephone number from a caller location, wherein the telephone number has an associated spatial key;

means for determining the spatial key of the telephone number;

means responsive to a dialed number for selecting data of a particular client from a plurality of client data accessible by the system;

means for finding the determined spatial key in the selected client data and retrieving spatial key dependent data from the client data, wherein:

a first location identified by the spatial key, said first location corresponding to the telephone number, is located within one of

(a) a predetermined radial distance from a second location corresponding to the retrieved spatial key dependent data and

(b) a geographic area bounded by a predetermined polygon that also encloses the second location; and

means for transmitting the retrieved spatial key dependent data to the telecommunications network, such that the caller is connected to the second location.

2. The system defined in claim 1, wherein the receiving means includes call decoding hardware.

3. The system defined in claim 1, wherein the means for determining the spatial key includes a master database.

4. The system defined in claim 1, wherein the means for finding the determined spatial key includes a client database.

5. The system defined in claim 1, wherein the transmitting means includes outbound calling means.

6. The system defined in claim 1, wherein the spatial key is a number.

7. The system defined in claim 6, wherein the spatial key is arbitrarily chosen so as to uniquely identify a geographic region.

8. The system defined in claim 1, wherein the spatial key comprises a postal code.

9. The system defined in claim 8, wherein the postal code comprises a zip+4 number.

10. The system defined in claim 8, wherein the postal code comprises a zip+6 number.

11. The system defined in claim 1, wherein the telephone number comprises an area code, a prefix and a suffix.

12. The system defined in claim 11, wherein the entire telephone number comprises at least ten digits.

13. The system defined in claim 1, wherein the spatial key provides a spatial resolution of at least 105 feet.

14. The system defined in claim 1, wherein a service area about the second location includes one or more postal coded areas, and wherein the postal coded areas are defined by zip codes.

15. The system defined in claim 1, additionally including means for providing selected information to be substituted for the telephone number.

16. The system defined in claim 1, additionally including means for enabling selected features.

17. The system defined in claim 1, wherein the spatial key comprises a location identifier.

18. The system defined in claim 1, wherein the radial distance is any client-defined distance and the polygon has any client-defined size and shape.

19. The system defined in claim 1, wherein the selected spatial key dependent data comprises a client telephone number.

20. A call processing system, comprising:

a telephone network;

a switch connected to the telephone network, the switch having a computer with a memory;

a master file comprising a plurality of records, each record having a telephone number field and a spatial key field, the master file stored in the computer;

a client file comprising a plurality of records, each record having a spatial key field and a client telephone number, the client file being stored in the computer, and wherein records are assigned to the client file based upon a location of a telephone, associated with the client telephone number, with respect to a geographic area of substantially any desired shape and size;

means, associated with the switch, for receiving a caller telephone number and a dialed telephone number from the telephone network;

means, associated with the switch, for selecting one of a plurality of client files, accessible by the computer, based on the dialed telephone number;

means, associated with the switch, for linking the master file and the client file to produce a selected client telephone number, wherein the master file is indexed by the received caller telephone number to provide a selected spatial key, and wherein the client file is indexed by the selected spatial key to provide the selected client telephone number; and

an outbound calling means associated with the switch for transmitting the selected client telephone number to the telephone network.

21. The system defined in claim 20, wherein the telephone network is a North American Standard public telephone network.

22. The system defined in claim 20, wherein the switch is a digital switch.

23. The system defined in claim 20, wherein the selected spatial key comprises a postal code.

24. The system defined in claim 23, wherein the postal code comprises a zip+4 code.

25. The system defined in claim 20, wherein the receiving means includes means for Automatic Number Identification (ANI).

26. The system defined in claim 20, additionally comprising means for exception handling wherein manual intervention is provided for handling non-routable exceptions in the linking means.

27. The system defined in claim 26, wherein the exception handling means includes means for processing the caller telephone number of a mobile telephone.

28. The system defined in claim 26, wherein the exception handling means includes means for processing the caller telephone number when the master file does not include a record having the caller telephone number.

29. The system defined in claim 26, wherein the exception handling means includes means for processing the caller telephone number when the client file does not include a record having the selected spatial key.

30. The system defined in claim 20, additionally comprising means for exception handling wherein manual intervention is provided for handling routable exceptions in the transmitting means.

31. The system defined in claim 20, wherein the linking means indexing makes use of a telephone number suffix.

32. In a telecommunications network, a method of automatically processing a telephone call, comprising the steps of:

automatically generating client tables comprising a plurality of records, each record comprising a spatial key and client information indicative of a geographic location, wherein for each client table, the method includes the step of providing a client service locations file containing a plurality of service location addresses, each location having a client-defined geographic service area of substantially any desired shape and size;

storing the client tables and a master table comprising a plurality of records, each record comprising a telephone number and a spatial key, in the telecommunications network;

receiving a caller telephone number and a dialed telephone number from the network;

indexing the master table with the received caller telephone number to obtain a master table record;

retrieving a spatial key from the master table record;

selecting one of the client tables from the plurality of client tables based on the dialed telephone number;

indexing the selected client table with the retrieved spatial key to obtain a selected client table record; and

retrieving selected client information from the selected client table record.

33. The method defined in claim **32**, wherein the step of generating, for each client table, comprises the steps of:

standardizing the service location addresses and client-defined geographic service areas as a set of latitude and longitude coordinates;

windowing the coordinates of one of the geographic service areas with prestored spatial key windows having associated spatial key lists;

determining whether a predefined geographic area overlaps the one geographic service area; and

creating a client table record including an overlapping predefined geographic area and the client information of the one geographic service area.

34. The method defined in claim **33**, additionally comprising the step of sorting a plurality of client table records by the spatial keys of said client table records.

35. The method defined in claim **33**, additionally comprising the step of repeating the windowing step for another one of the geographic service areas, wherein each windowing step includes the step of repeating the determining step and the creating step for each coded geographic area contained within the current geographic service area.

36. The method defined in claim **32**, additionally comprising the step of transmitting the selected client information to the network.

37. The method defined in claim **32**, wherein the dialed telephone number is an "800" number.

38. The method defined in claim **32**, wherein one of the service areas is defined by a predetermined radial distance.

39. The method defined in claim **32**, wherein one of the service areas is defined by a predetermined area of a polygon.

40. The method defined in claim **32**, wherein one of the service location addresses is defined to be the closest geographic distance to a location identified by the spatial key.

41. The method defined in claim **32**, wherein each spatial key uniquely identifies an area in a coordinate system.

42. The method defined in claim **41**, wherein the coordinate system comprises longitude and latitude coordinates.

43. The method defined in claim **41**, wherein the coordinate system comprises Ordinance Survey coordinates.

44. The method defined in claim **32**, wherein one of the spatial keys comprises a zip+4 code.

45. The method defined in claim **44**, wherein one of the service areas includes one or more zip+4 coded areas.

46. The method defined in claim **32**, wherein each record of the client table includes a distance between a service location address and a coded geographic area.

47. The method defined in claim **32**, additionally comprising the step of transmitting the selected client information to the telecommunications network.

48. The method defined in claim **32**, wherein the client information comprises a client telephone number.

49. The method defined in claim **32**, wherein each spatial key comprises a postal code.

50. A table generation process for use in a call processing system in a telephone network, comprising the steps of:

providing a plurality of service locations each location having an associated, specified service area;

windowing coordinates of one of the service areas with a plurality of prestored spatial key windows, each spatial key window having an associated spatial key list, each spatial key list having one or more spatial keys, wherein each spatial key is indicative of a spatial key area, such that the windowing step generates a composite spatial key list; and

creating a client table record including one of the spatial keys contained within said one of the service areas and client information corresponding to said one of the service areas.

51. The method defined in claim **50**, wherein the service area comprises an area defined by a preselected radial distance around the service location.

52. The method defined in claim **50**, wherein the service area comprises a preselected geographic boundary, and wherein the boundary has substantially any client-defined size and shape.

53. The method defined in claim **52**, wherein the boundary defines a polygon.

54. The method defined in claim **50**, wherein the service location is defined by geographic coordinates.

55. The method defined in claim **50**, wherein the client information comprises a client telephone number.

56. The method defined in claim **50**, additionally comprising the step of repeating the windowing step for another one of the service areas, wherein each windowing step includes the step of repeating the creating step for each spatial key contained within the current service area.

57. The method defined in claim **50**, wherein following the windowing step, the method comprises the step of overlapping spatial key areas corresponding to the spatial keys in the composite spatial key list with the service area so as to identify spatial keys located within the said one of the service areas.

58. In a telephone network, an automated call processing system, comprising:

call decoding means capable of determining a telephone number of a caller;

means responsive to the caller number for determining a spatial key;

means responsive to a dialed number for selecting a client database from a plurality of client databases accessible by the system;

means responsive to the spatial key for providing selected spatial key dependent data of a destination location for the selected client, wherein the destination location is associated with a service area having a client defined geographic configuration of substantially any desired shape and size; and

outbound calling means for transmitting the selected spatial key dependent data to the telephone network, such that the caller is connected to the destination location.

59. The system defined in claim 58, wherein the spatial key comprises a postal code.

60. The system defined in claim 59, wherein the postal code comprises a zip+4 number.

61. The system defined in claim 58, wherein said destination location lies within a service area comprising at least one predefined geographic area.

62. In a telephone network, an automated call processing system, comprising:

call decoding means for determining a telephone number of a caller, wherein the telephone number comprises an area code, a prefix and a suffix;

means responsive to the telephone number for determining a spatial key, wherein the telephone number and the spatial key are stored in a master database;

means responsive to the spatial key for providing client information of a destination location, wherein the destination location has a predefined geographic relationship to the source location, and wherein the relationship is determined by a user-defined perimeter about the destination location; and

outbound calling means for transmitting the client information to the telephone network, such that the caller is connected to the destination location.

63. The system defined in claim 62, wherein the user-defined perimeter defines a radial distance from the destination location.

64. The system defined in claim 62, wherein the user-defined perimeter defines a polygon about the destination location.

65. The system defined in claim 62, wherein the spatial key determining means utilizes the telephone number suffix to index the master database.

66. The system defined in claim 62, wherein the telephone number comprises a third party number.

67. In a telephone network, an automated call processing system, comprising:

call decoding means for determining an identifier of a first location;

means for determining a spatial key of the identifier;

means responsive to the spatial key for accessing client information corresponding to a second location, wherein the second location is associated with a service area having a client defined geographic configuration of substantially any desired shape and size; and

outbound calling means for transmitting the client information to the telephone network, such that the first location is connected to the second location by a routed telephone call.

68. The system defined in claim 67, wherein the spatial key comprises a postal code.

69. In a telephone network, an automated call processing system, comprising:

call decoding means for determining a telephone number of a caller;

means for determining a spatial key of the entire telephone number;

means for retrieving spatial key dependent data corresponding to a selected client location, wherein said means includes a client database and wherein the client database is created based on a plurality of client locations, each location having an associated client-defined service area of substantially any desired shape and size; and

outbound calling means for transmitting the spatial key dependent data to the telephone network, such that the caller is connected to the selected client location.

70. The system defined in claim 69, wherein the client database is selected from a plurality of client databases based on a telephone number transmitted from the caller.

71. The system defined in claim 69, wherein entries for spatial keys in the client database comprise:

for an exclusive service area, a single record entry per spatial key, the record comprising a client telephone number; and

for a non-exclusive service area, a multiple record entry per spatial key, each of the multiple records comprising a different client telephone number.

72. In a telephone network, a method of generating a client database comprising a plurality of records, each record comprising a spatial key and client information indicative of a service location, the method comprising the steps of:

providing a client service locations file containing a plurality of service location addresses, each location having a service area comprising a client-defined geographic configuration of substantially any desired shape and size;

standardizing the service location addresses and client-defined geographic service areas as a set of position determining coordinates;

windowing the coordinates with prestored spatial key windows so as to identify a first list of the windows that each service area overlaps;

determining a second list of spatial key defined areas overlapping the spatial key windows in the first list;

eliminating the spatial key defined areas in the second list that are not within one of the service areas; and

creating a plurality of client database records, wherein each record includes the spatial key corresponding to one of the spatial key areas in the second list and the client information corresponding with the service location.

73. The method defined by claim 72, wherein each record additionally includes a distance field.

74. The method defined by claim 73, wherein a distance value to be stored in the distance field is the distance from the service location address to the centroid of the spatial key area.

75. The method defined by claim 74, wherein the client database records are sorted by spatial key and by distance value for each spatial key.

76. The method defined by claim 75, additionally including the step of processing the sorted client database records to create a client database, wherein each record defines a service area that is closest to a caller location.

77. The method defined by claim 76, wherein the processing step selects the record with the shortest distance between the location of the caller and the client service location for each spatial key.

78. The method defined by claim 72, additionally comprising the step of loading the client database into a telephone network switch computer.

79. The method defined by claim 72, additionally comprising the steps of:

providing a client-specified polygonal trade area of substantially any desired shape and size for each client

service location wherein the configuration of the trade area includes a plurality of vertices;

digitizing the coordinates of the vertices; and

building a line index file of points that define the boundary of the polygonal trade area.

80. In a telecommunications network, an automated call processing system, comprising:

call decoding means for determining a telephone number of a caller, wherein the caller number has an associated spatial key;

means for determining the spatial key of the caller number;

means responsive to a dialed number for selecting a client database from a plurality of client databases accessible by the system;

means for addressing the selected client database by the determined spatial key;

means for retrieving spatial key dependent data stored in the selected client database, wherein:

a first location identified by the spatial key, said final location corresponding to the caller number, is located within one of

(a) a predetermined radial distance from a second location corresponding to the retrieved spatial key dependent data and

(b) a geographic area bounded by a predetermined polygon that also encloses the second location; and

means for transmitting the retrieved spatial key dependent data to the telecommunications network.

81. The system defined in claim **80**, additionally including means for providing selected information to be substituted for the caller number.

82. The system defined in claim **80**, wherein the retrieved spatial key dependent data comprises a client telephone number.

83. In a telephone network call processing system, a method of generating a geographic database of spatial keys linked to client service areas and associated service area information, the method comprising the steps of:

providing a predefined master list of spatial keys identifying geographic areas defined by spatial coordinates;

supplying a list of client service areas of substantially any desired shape and size, wherein each service area is geographically defined by spatial coordinates; and

linking spatial keys from said predefined master list to client service areas based on the geographic spatial coordinate overlapping relationships between the client service areas and the spatial keys.

84. The method defined in claim **83**, wherein one of the spatial keys comprises a telephone number.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 5,506,897

DATED : April 9, 1996

INVENTOR(S) : Moore et al.

It is certified that error appears in the above-indentified patent and that said Letters Patent is hereby corrected as shown below:

Column 35, line 21, delete "final" and substitute --first--.

Signed and Sealed this

FourthDay of August, 1998

Bruce Lehman

Attest:

BRUCE LEHMAN

Attesting Officer

Commissioner of Patents and Trademarks

US005506897B1

(12) REEXAMINATION CERTIFICATE (4501st)

United States Patent
Moore et al.

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(45) Certificate Issued: Dec. 11, 2001

(54) AUTOMATIC ROUTING SYSTEM FOR TELEPHONIC SERVICES

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(51) **Int. Cl.**[7] **H04M 3/42**

(52) **U.S. Cl.** **379/220.01**; 379/201.02; 379/912

(58) **Field of Search** 379/127.01, 142.03, 379/142.04, 142.06, 201.01, 201.02, 201.03, 202.01, 207.02, 207.14, 207.15, 211.01, 220.01, 221.14, 230; 370/259

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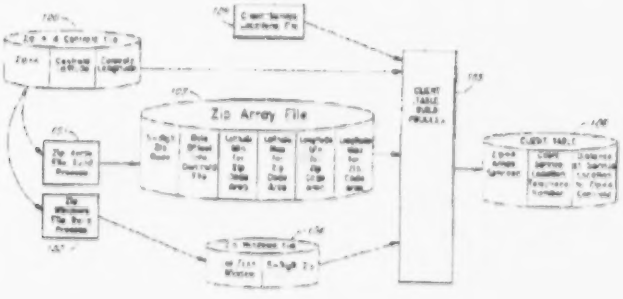
Primary Examiner—Scott L. Weaver

(57) **ABSTRACT**

A system and method for automatically and seamlessly routing telephone calls across a telephone network. The system includes a telephone switch having a computer, a master file and client file stored in the computer, in which the master file is dynamically linked with the client file at routing time to produce a selected client telephone number which is transmitted across the telephone network. The system utilizes Automatic Number Identification to identify the calling party. The master file has a plurality of records having a telephone number field and a spatial key field and is updated frequently. The client file has a plurality of records having a spatial key field and a client telephone number. Methods of generating the client files for three client service area definitions are included in the present invention.



US 5,506,897 C1

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REEXAMINATION CERTIFICATE ISSUED UNDER 35 U.S.C. 307

NO AMENDMENTS HAVE BEEN MADE TO THE PATENT

2

AS A RESULT OF REEXAMINATION, IT HAS BEEN DETERMINED THAT:

The patentability of claims 1–84 is confirmed.

* * * * *

US005848131A

United States Patent [19]

Shaffer et al.

[11] **Patent Number: 5,848,131**

[45] **Date of Patent: *Dec. 8, 1998**

[54] **AUTOMATIC INFORMATION AND ROUTING SYSTEM FOR TELEPHONIC SERVICES**

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[73] Assignee: **Murex Securities, Ltd.**, Douglas, Isle of Man

[*] Notice: This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).

[21] Appl. No.: **598,392**

[22] Filed: **Feb. 8, 1996**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 365,325, Dec. 28, 1994, Pat. No. 5,506,897, which is a continuation of Ser. No. 20,653, Feb. 22, 1993, abandoned.

[51] **Int. Cl.**[6] **H04M 3/42**

[52] **U.S. Cl.** **379/88**; 379/67.1; 379/201; 379/211; 379/220

[58] **Field of Search** 379/127, 142, 379/201, 202, 207, 210, 211, 216, 220, 221, 230, 265, 67.1, 88.2, 88.19, 93.01, 88.22; 395/2.4; 704/231

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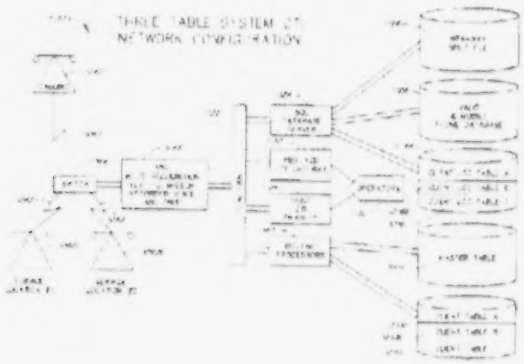
Targus Information Corporation, "DART Intelligent Call Processing" brochure, Jan. 17, 1995.

Primary Examiner—Krista Zele
Assistant Examiner—Scott Wolinsky
Attorney, Agent, or Firm—Knobbe, Martens, Olson & Bear, LLP

[57] **ABSTRACT**

A system and method for automatically and seamlessly routing telephone calls across a telephone network. The system includes a telephone switch having a computer, a master file and client file stored in the computer. The master file is dynamically linked to the client file at routing time to produce a selected client telephone number which is transmitted across the telephone network. The system utilizes Automatic Number Identification to identify the calling party. The master file has a plurality of records having a telephone number and a spatial key and is updated frequently. The client file has a plurality of records having a spatial key and a client telephone number. Methods of generating client file records for both radius and polygon defined service areas through an automated computer process are included in the present invention. Another embodiment of the system utilizes a location ID in place of the client telephone number of the client file. A client location file containing client-specific information on an individual service location basis is additionally utilized. The client-specific service location information may be recited to the caller via a voice response unit and the call may optionally be routed to the service location. The client service locations may be unattended by a human and may not have a telephone associated with the location.

85 Claims, 29 Drawing Sheets



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B1 4,757,267	5/1991	Riskin	379/113

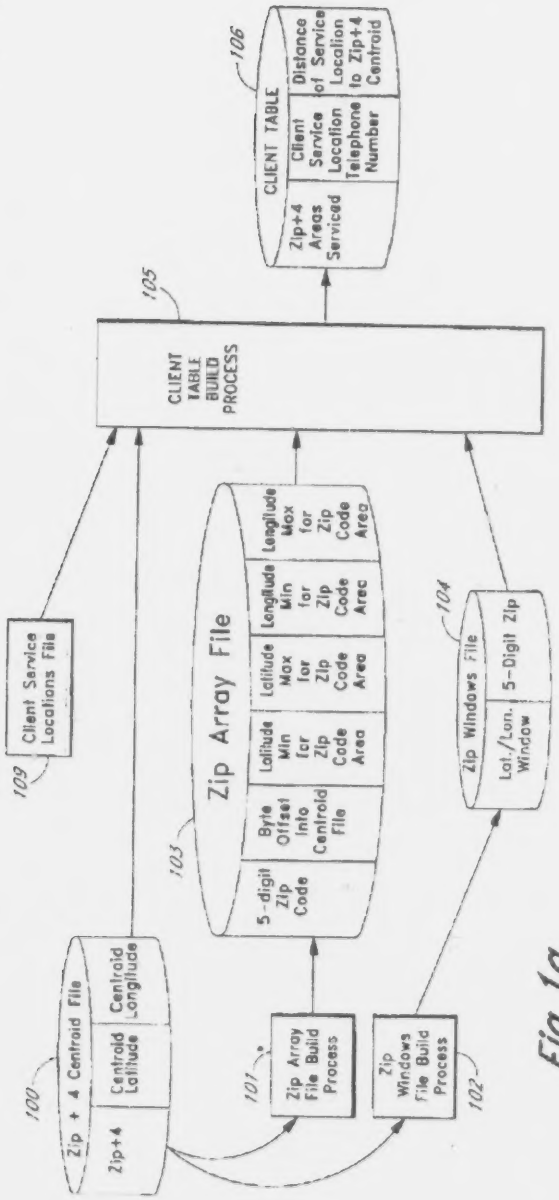
Zip + 4 Centroid File
Zip+4
Centroid Latitude
Centroid Longitude
100
Zip Array File Build Process
101
Zip Windows File Build Process
102
Zip Array File
5-digit Zip Code
Byte Offset Into Centroid File
Latitude Min for Zip Code Area
Latitude Max for Zip Code Area
Longitude Min for Zip Code Area
Longitude Max for Zip Code Area
103
Zip Windows File
Lat./Lon. Window
5-Digit Zip
104
Client Service Locations File
109
CLIENT TABLE BUILD PROCESS
105
CLIENT TABLE
Zip+4 Areas Serviced
Client Service Location Telephone Number
Distance of Service Location to Zip+4 Centroid
106
MASTER TABLE
Telephone Number of Caller
Zip+4 of Caller
6197555666
920752064
107
CLIENT TABLE
Zip+4
Client Telephone
Distance
920752064
6194817777
1.2864

Fig. 1a

Fig. 1b

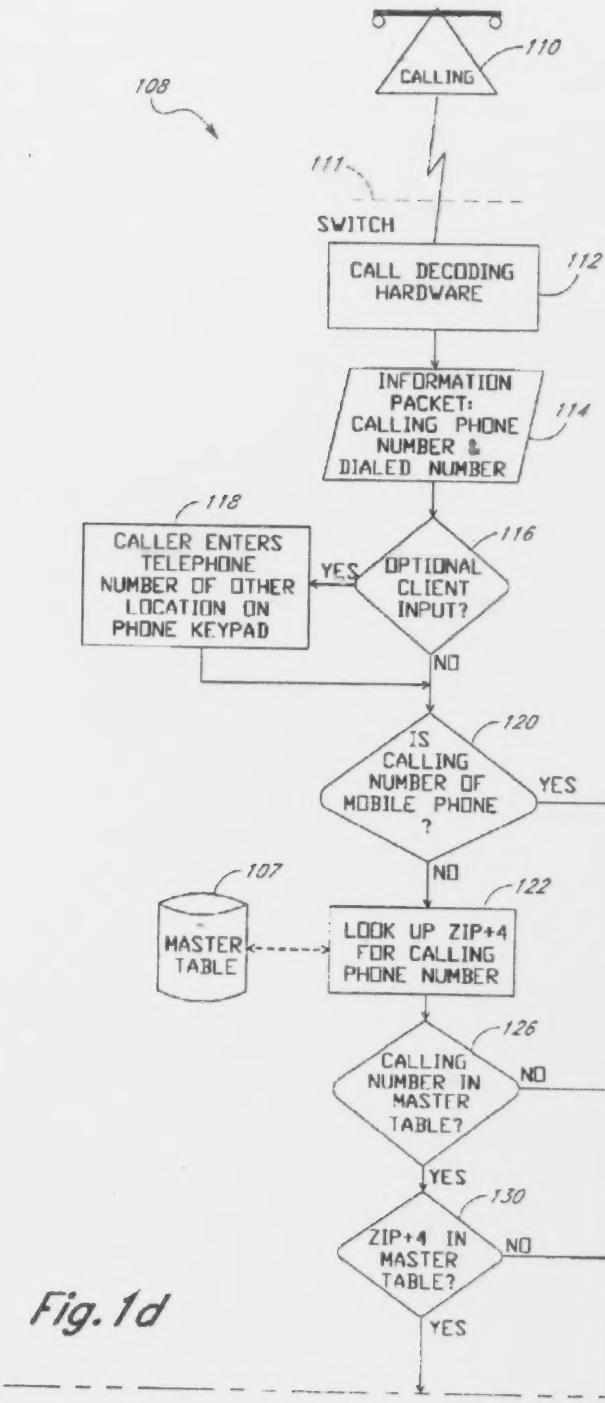

Fig. 1d

Fig. 1d

Fig. 1e

Fig. 1c

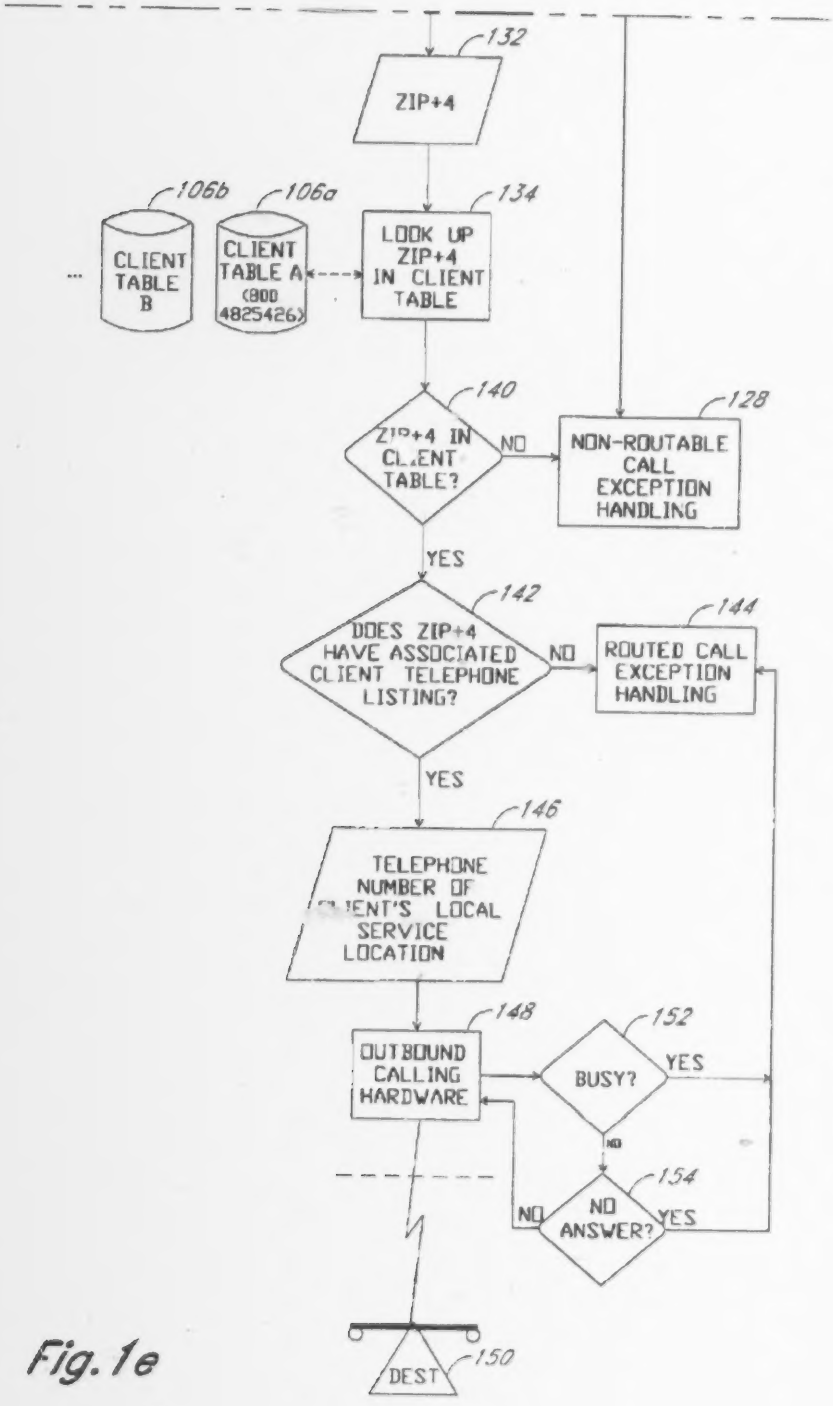
132
ZIP+4
106b
106a
134
CLIENT TABLE B
CLIENT TABLE A (800 4825426)
LOOK UP ZIP+4 IN CLIENT TABLE
140
ZIP+4 IN CLIENT TABLE?
NO
128
NON-ROUTABLE CALL EXCEPTION HANDLING
YES
142
DOES ZIP+4 HAVE ASSOCIATED CLIENT TELEPHONE LISTING?
NO
144
ROUTED CALL EXCEPTION HANDLING
YES
146
TELEPHONE NUMBER OF CLIENT'S LOCAL SERVICE LOCATION
148
OUTBOUND CALLING HARDWARE
152
BUSY?
YES
NO
154
NO ANSWER?
NO
YES
DEST
150

Fig. 1e

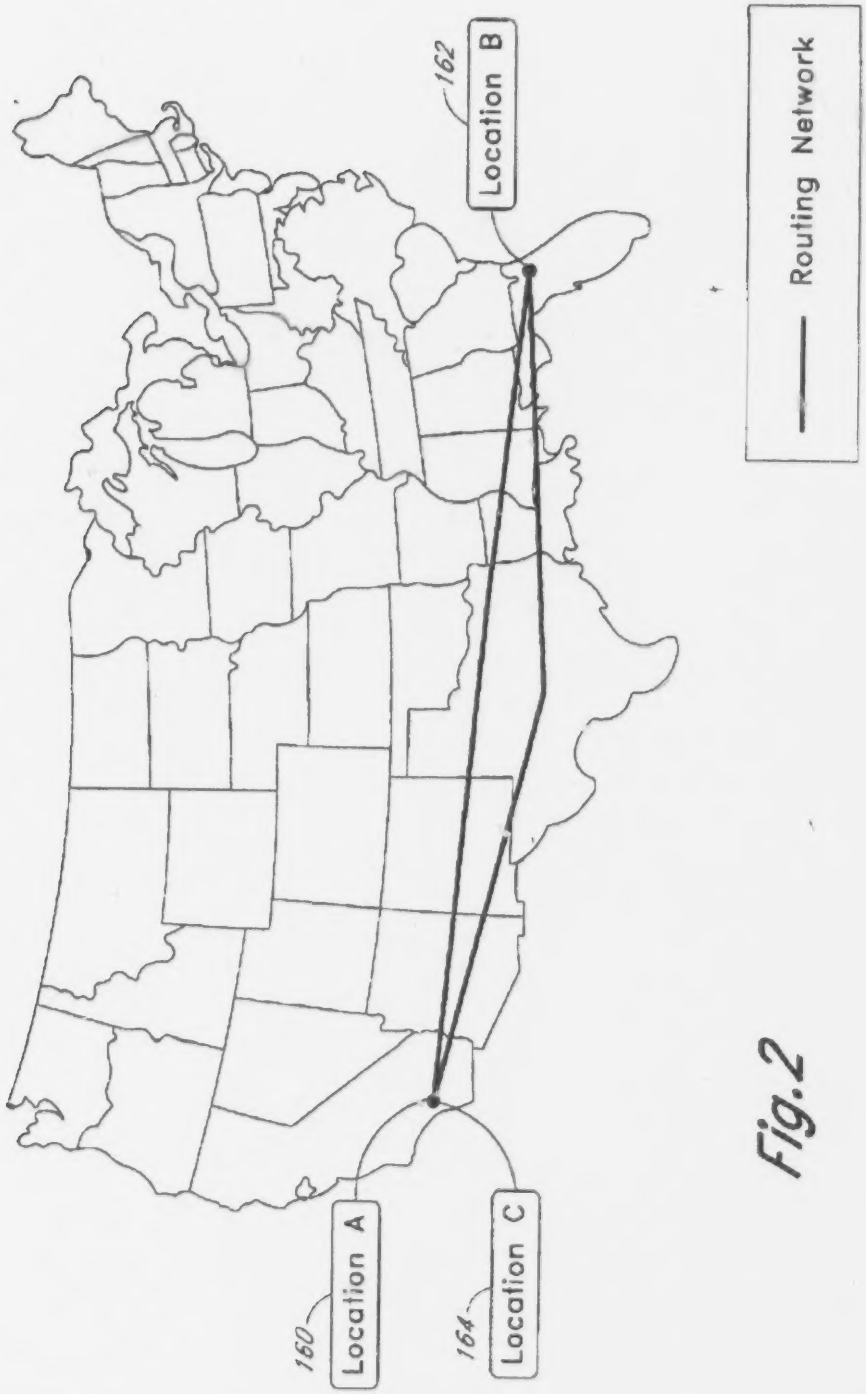
Routing Network
Location B
162
Location A
160
Location C
164

Fig. 2

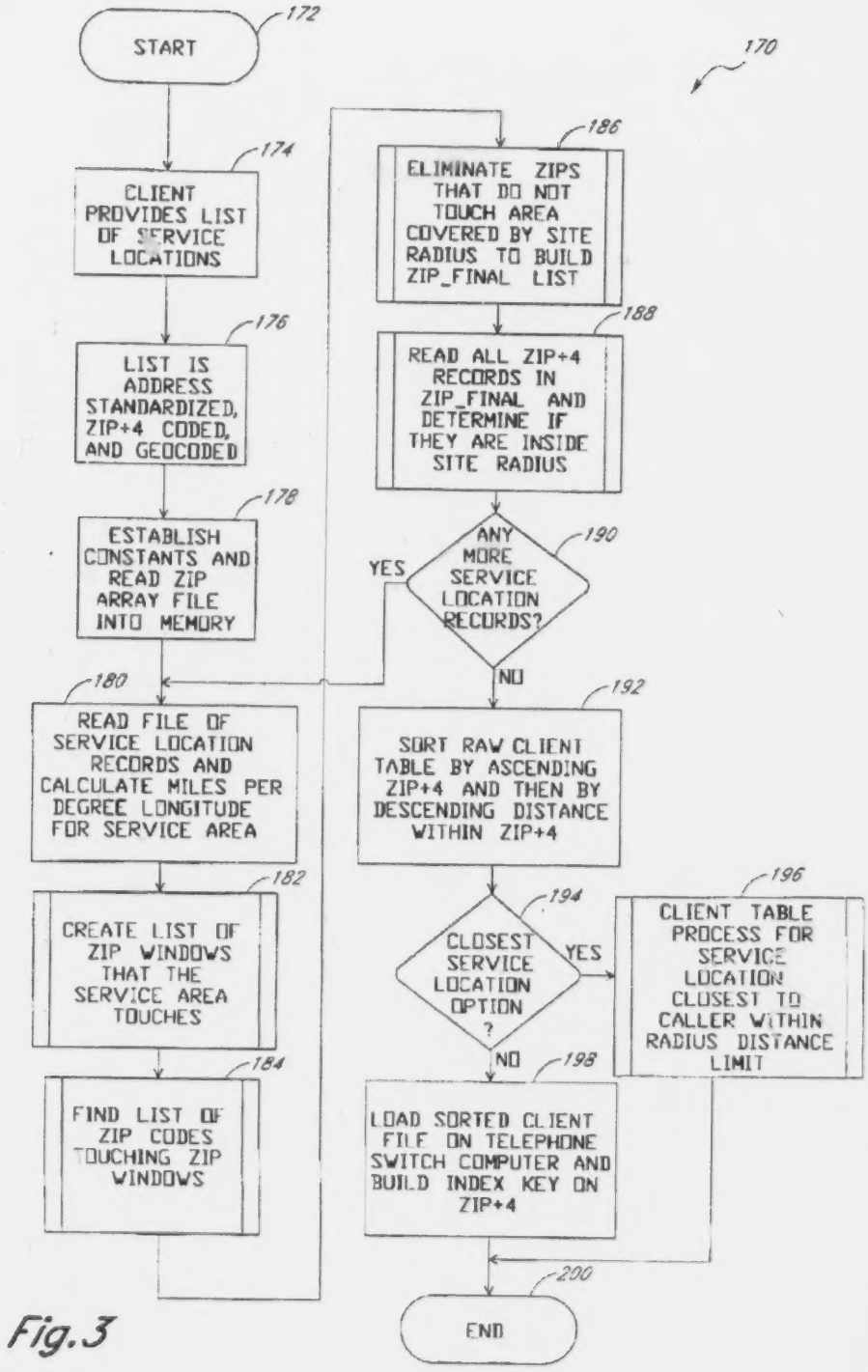
START
172
170
CLIENT PROVIDES LIST OF SERVICE LOCATIONS
174
LIST IS ADDRESS STANDARDIZED, ZIP+4 CODED, AND GEOCODED
176
ESTABLISH CONSTANTS AND READ ZIP ARRAY FILE INTO MEMORY
178
READ FILE OF SERVICE LOCATION RECORDS AND CALCULATE MILES PER DEGREE LONGITUDE FOR SERVICE AREA
180
CREATE LIST OF ZIP WINDOWS THAT THE SERVICE AREA TOUCHES
182
FIND LIST OF ZIP CODES TOUCHING ZIP WINDOWS
184
ELIMINATE ZIPS THAT DO NOT TOUCH AREA COVERED BY SITE RADIUS TO BUILD ZIP_FINAL LIST
186
READ ALL ZIP+4 RECORDS IN ZIP_FINAL AND DETERMINE IF THEY ARE INSIDE SITE RADIUS
188
ANY MORE SERVICE LOCATION RECORDS?
190
YES
NO
SORT RAW CLIENT TABLE BY ASCENDING ZIP+4 AND THEN BY DESCENDING DISTANCE WITHIN ZIP+4
192
CLOSEST SERVICE LOCATION OPTION ?
194
YES
NO
CLIENT TABLE PROCESS FOR SERVICE LOCATION CLOSEST TO CALLER WITHIN RADIUS DISTANCE LIMIT
196
LOAD SORTED CLIENT FILE ON TELEPHONE SWITCH COMPUTER AND BUILD INDEX KEY ON ZIP+4
198
END
200

Fig. 3

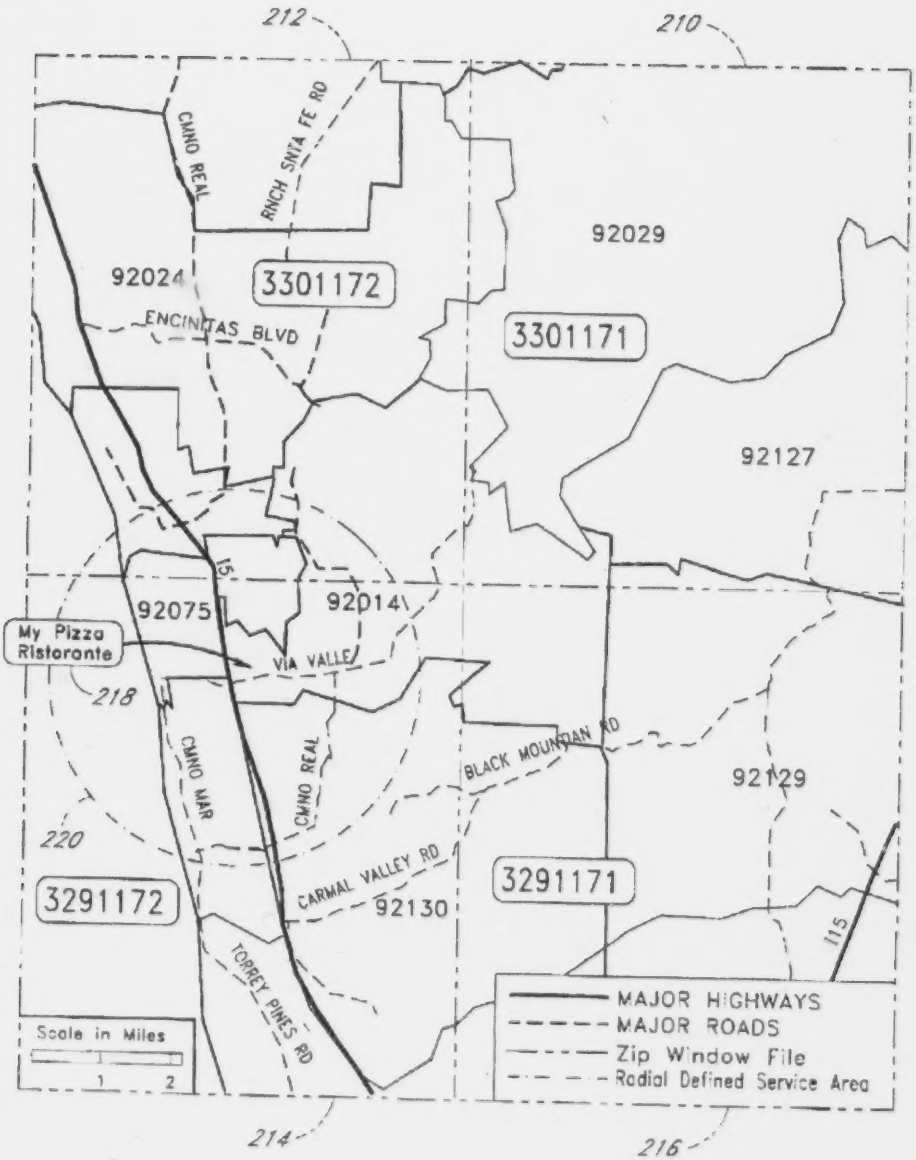
212
210
CMNO REAL
RNCH SNTA FE RD
92024
3301172
ENCINITAS BLVD
92029
3301171
92127
15
92075
92014
My Pizza Ristorante
VIA VALLE
218
CMNO MAR
CMNO REAL
BLACK MOUNTAIN RD
92129
220
CARMAL VALLEY RD
3291172
92130
3291171
115
TORREY PINES RD
Scale in Miles
1
2
MAJOR HIGHWAYS
MAJOR ROADS
Zip Window File
Radial Defined Service Area
214
216

Fig. 4

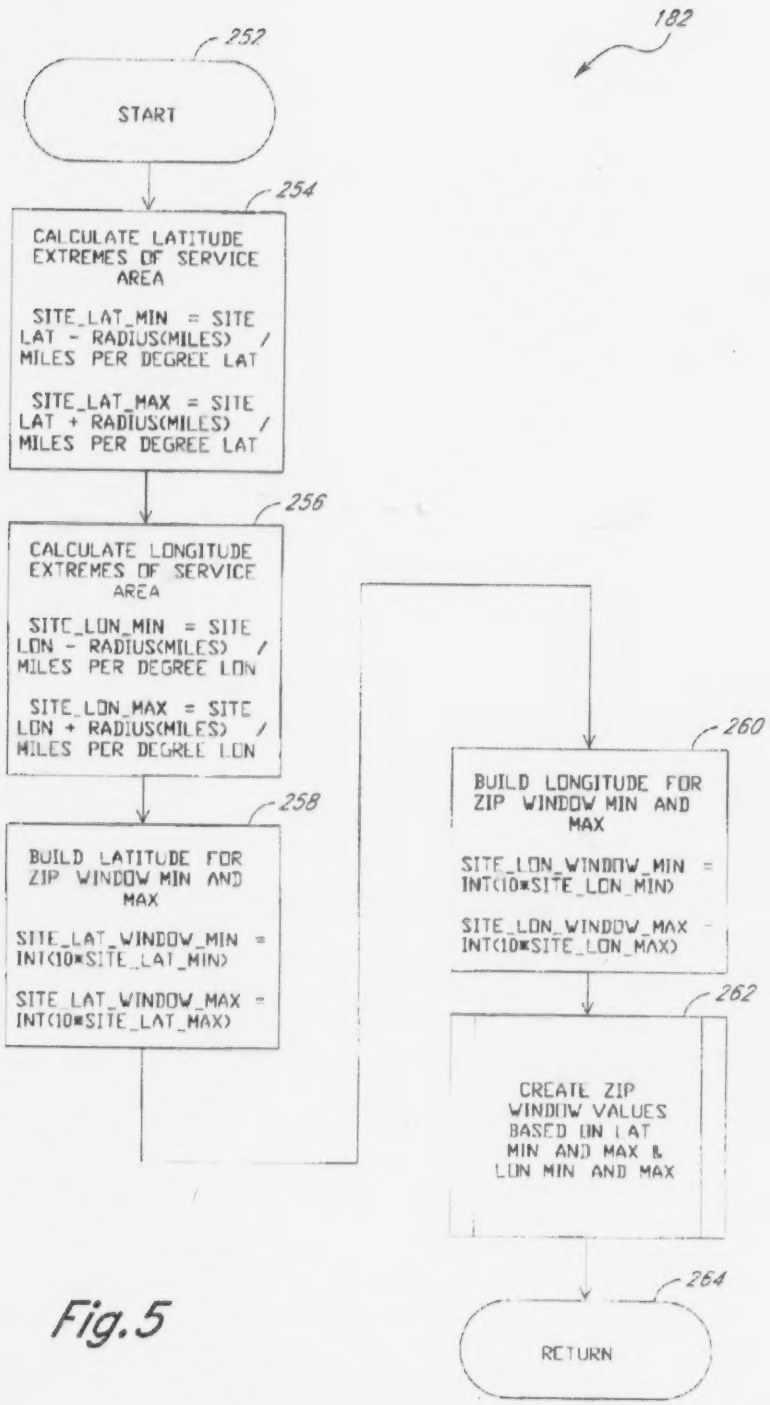
182
252
START
254
CALCULATE LATITUDE EXTREMES OF SERVICE AREA
SITE_LAT_MIN = SITE LAT - RADIUS(MILES) / MILES PER DEGREE LAT
SITE_LAT_MAX = SITE LAT + RADIUS(MILES) / MILES PER DEGREE LAT
256
CALCULATE LONGITUDE EXTREMES OF SERVICE AREA
SITE_LON_MIN = SITE LON - RADIUS(MILES) / MILES PER DEGREE LON
SITE_LON_MAX = SITE LON + RADIUS(MILES) / MILES PER DEGREE LON
258
BUILD LATITUDE FOR ZIP WINDOW MIN AND MAX
SITE_LAT_WINDOW_MIN = INT(10*SITE_LAT_MIN)
SITE_LAT_WINDOW_MAX = INT(10*SITE_LAT_MAX)
260
BUILD LONGITUDE FOR ZIP WINDOW MIN AND MAX
SITE_LON_WINDOW_MIN = INT(10*SITE_LON_MIN)
SITE_LON_WINDOW_MAX = INT(10*SITE_LON_MAX)
262
CREATE ZIP WINDOW VALUES BASED ON LAT MIN AND MAX & LON MIN AND MAX
264
RETURN

Fig.5

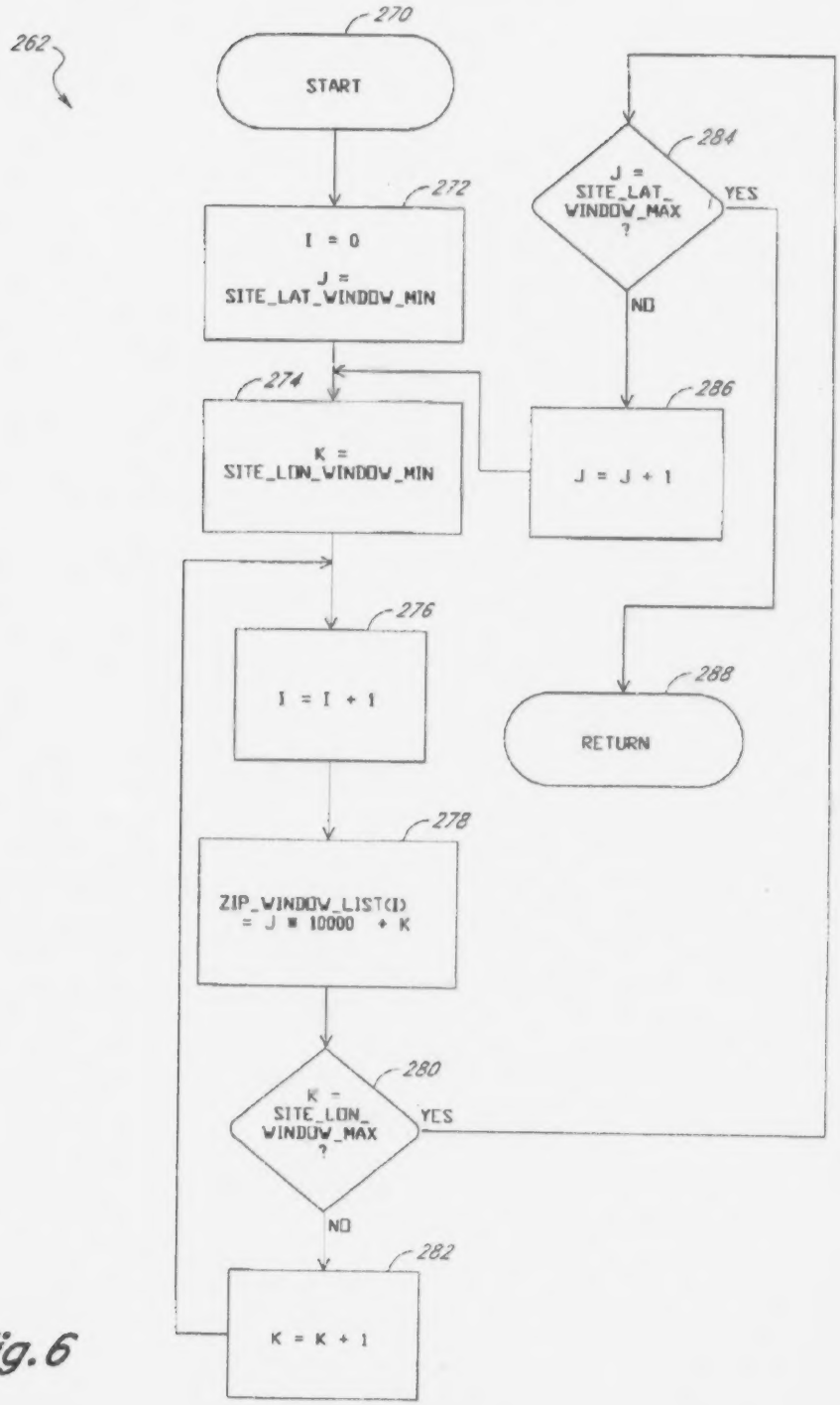
262
270
START
272
I = 0
J = SITE_LAT_WINDOW_MIN
274
K = SITE_LON_WINDOW_MIN
276
I = I + 1
278
ZIP_WINDOW_LIST(I) = J * 10000 + K
280
K = SITE_LON_WINDOW_MAX ?
YES
NO
282
K = K + 1
284
J = SITE_LAT_WINDOW_MAX ?
YES
NO
286
J = J + 1
288
RETURN

Fig. 6

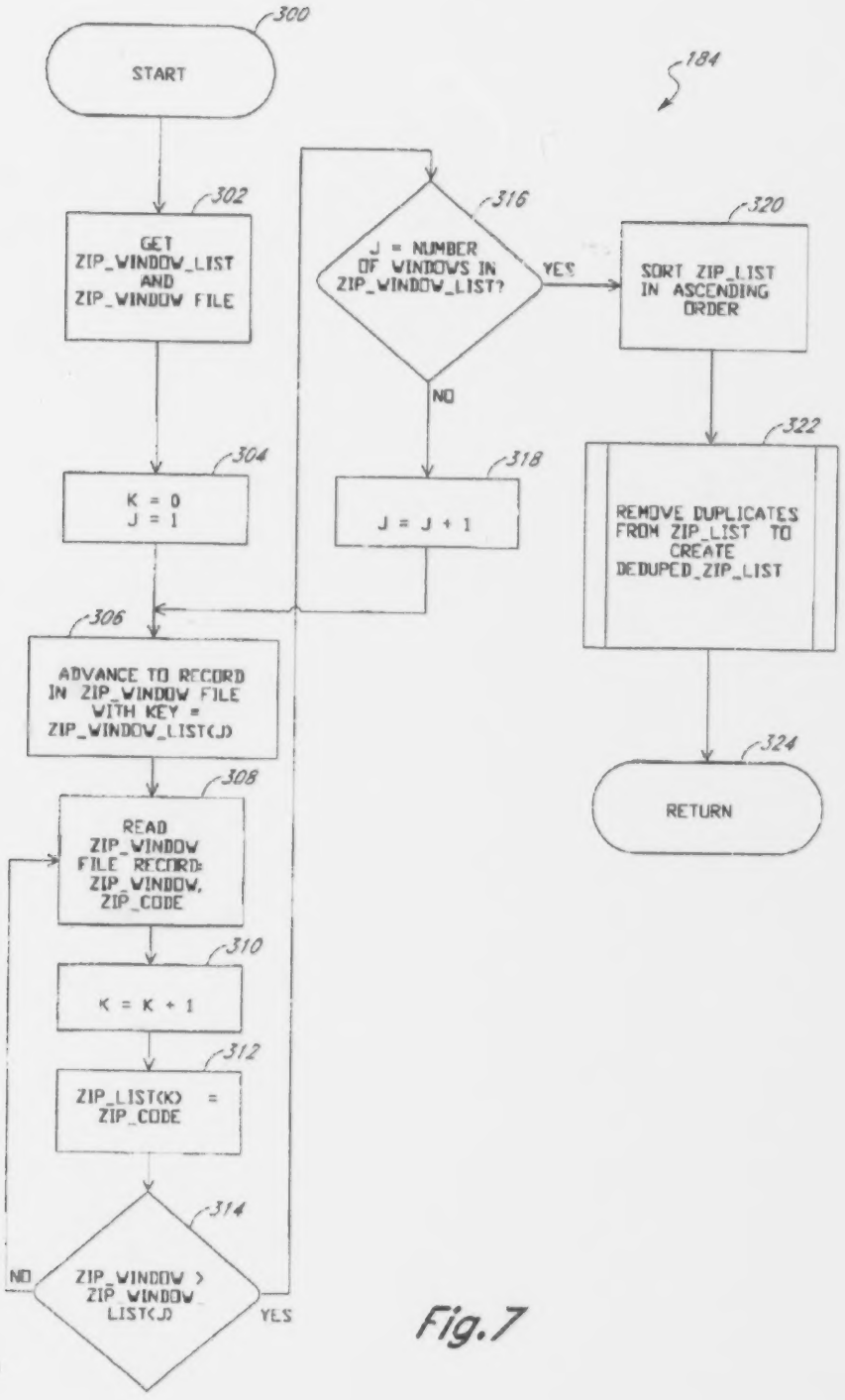
300
START
184
302
GET ZIP_WINDOW_LIST AND ZIP_WINDOW FILE
304
K = 0
J = 1
306
ADVANCE TO RECORD IN ZIP_WINDOW FILE WITH KEY = ZIP_WINDOW_LIST(J)
308
READ ZIP_WINDOW FILE RECORD: ZIP_WINDOW, ZIP_CODE
310
K = K + 1
312
ZIP_LIST(K) = ZIP_CODE
314
ZIP_WINDOW > ZIP_WINDOW_LIST(J)
NO
YES
316
J = NUMBER OF WINDOWS IN ZIP_WINDOW_LIST?
YES
NO
318
J = J + 1
320
SORT ZIP_LIST IN ASCENDING ORDER
322
REMOVE DUPLICATES FROM ZIP_LIST TO CREATE DEDUPED_ZIP_LIST
324
RETURN

Fig.7

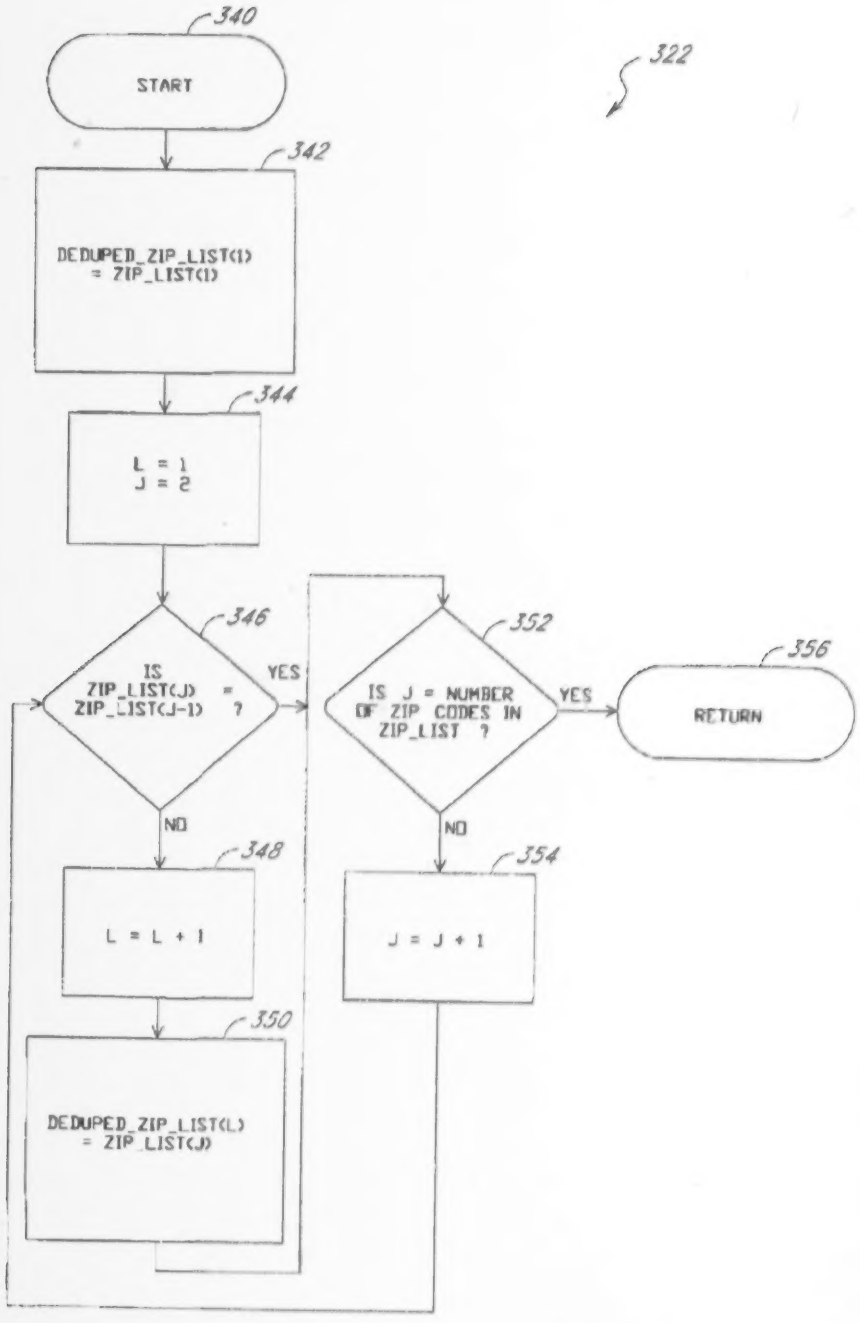
340
START
322
342
DEDUPED_ZIP_LIST(1) = ZIP_LIST(1)
344
L = 1
J = 2
346
IS ZIP_LIST(J) = ZIP_LIST(J-1) ?
YES
NO
352
IS J = NUMBER OF ZIP CODES IN ZIP_LIST ?
YES
356
RETURN
NO
348
L = L + 1
354
J = J + 1
350
DEDUPED_ZIP_LIST(L) = ZIP_LIST(J)

Fig.8

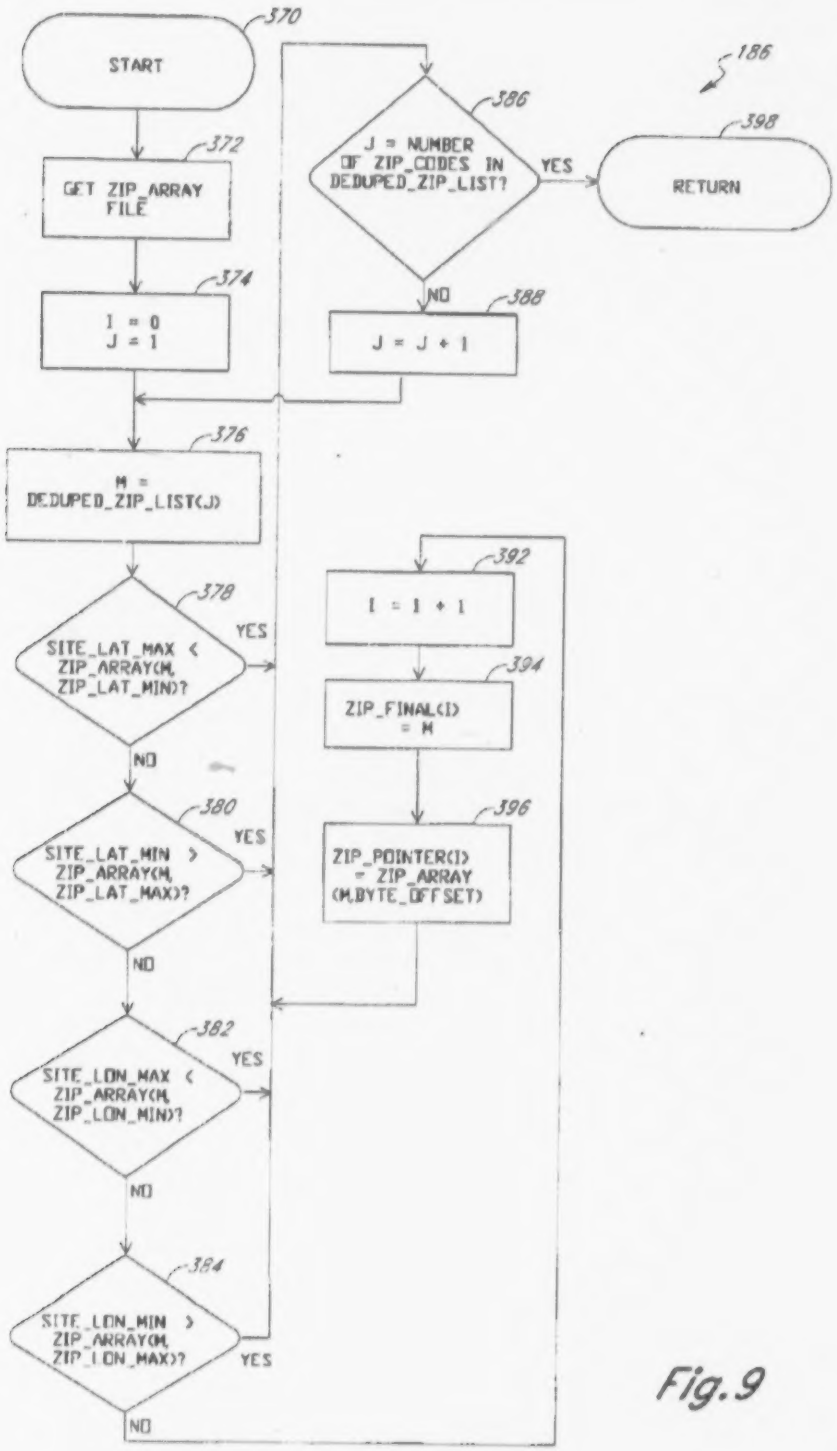
370
START
372
GET ZIP_ARRAY FILE
374
I = 0
J = 1
376
M = DEDUPED_ZIP_LIST(J)
378
SITE_LAT_MAX < ZIP_ARRAY(M, ZIP_LAT_MIN)?
YES
NO
380
SITE_LAT_MIN > ZIP_ARRAY(M, ZIP_LAT_MAX)?
YES
NO
382
SITE_LON_MAX < ZIP_ARRAY(M, ZIP_LON_MIN)?
YES
NO
384
SITE_LON_MIN > ZIP_ARRAY(M, ZIP_LON_MAX)?
YES
NO
386
J = NUMBER OF ZIP_CODES IN DEDUPED_ZIP_LIST?
YES
NO
388
J = J + 1
392
I = I + 1
394
ZIP_FINAL(I) = M
396
ZIP_POINTER(I) = ZIP_ARRAY (M,BYTE_OFFSET)
186
398
RETURN

Fig. 9

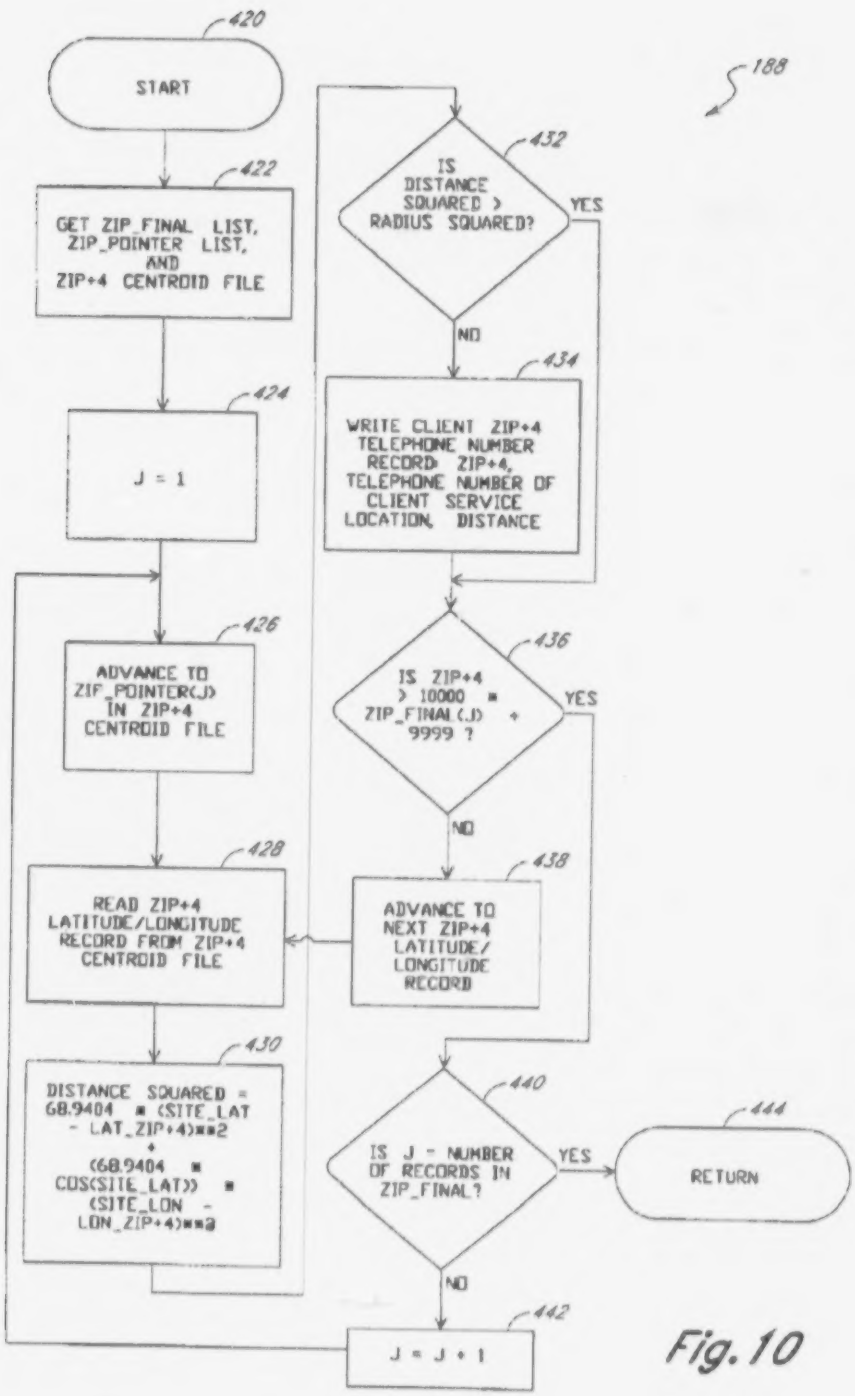
420
START
422
GET ZIP_FINAL LIST, ZIP_POINTER LIST, AND ZIP+4 CENTROID FILE
424
J = 1
426
ADVANCE TO ZIP_POINTER(J) IN ZIP+4 CENTROID FILE
428
READ ZIP+4 LATITUDE/LONGITUDE RECORD FROM ZIP+4 CENTROID FILE
430
DISTANCE SQUARED = 68.9404 * (SITE_LAT - LAT_ZIP+4)**2 + (68.9404 * COS(SITE_LAT)) * (SITE_LON - LON_ZIP+4)**2
188
432
IS DISTANCE SQUARED > RADIUS SQUARED?
YES
NO
434
WRITE CLIENT ZIP+4 TELEPHONE NUMBER RECORD ZIP+4, TELEPHONE NUMBER OF CLIENT SERVICE LOCATION, DISTANCE
436
IS ZIP+4 > 10000 * ZIP_FINAL(J) + 9999 ?
YES
NO
438
ADVANCE TO NEXT ZIP+4 LATITUDE/ LONGITUDE RECORD
440
IS J = NUMBER OF RECORDS IN ZIP_FINAL?
YES
444
RETURN
NO
442
J = J + 1

Fig. 10

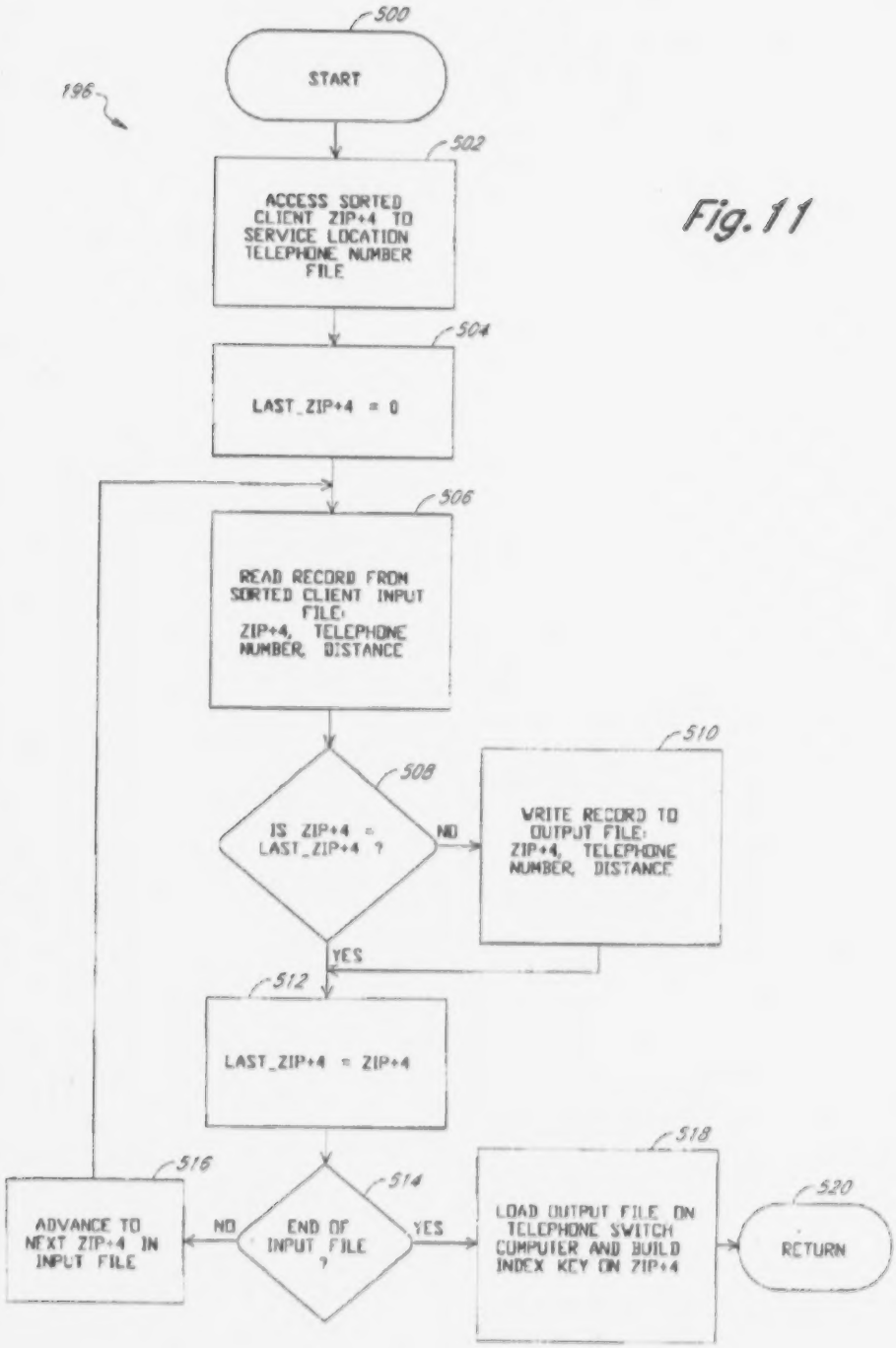
196
500
START
502
ACCESS SORTED CLIENT ZIP+4 TO SERVICE LOCATION TELEPHONE NUMBER FILE
504
LAST_ZIP+4 = 0
506
READ RECORD FROM SORTED CLIENT INPUT FILE: ZIP+4, TELEPHONE NUMBER, DISTANCE
508
IS ZIP+4 = LAST_ZIP+4 ?
NO
510
WRITE RECORD TO OUTPUT FILE: ZIP+4, TELEPHONE NUMBER, DISTANCE
YES
512
LAST_ZIP+4 = ZIP+4
514
END OF INPUT FILE ?
NO
516
ADVANCE TO NEXT ZIP+4 IN INPUT FILE
YES
518
LOAD OUTPUT FILE ON TELEPHONE SWITCH COMPUTER AND BUILD INDEX KEY ON ZIP+4
520
RETURN

Fig. 11

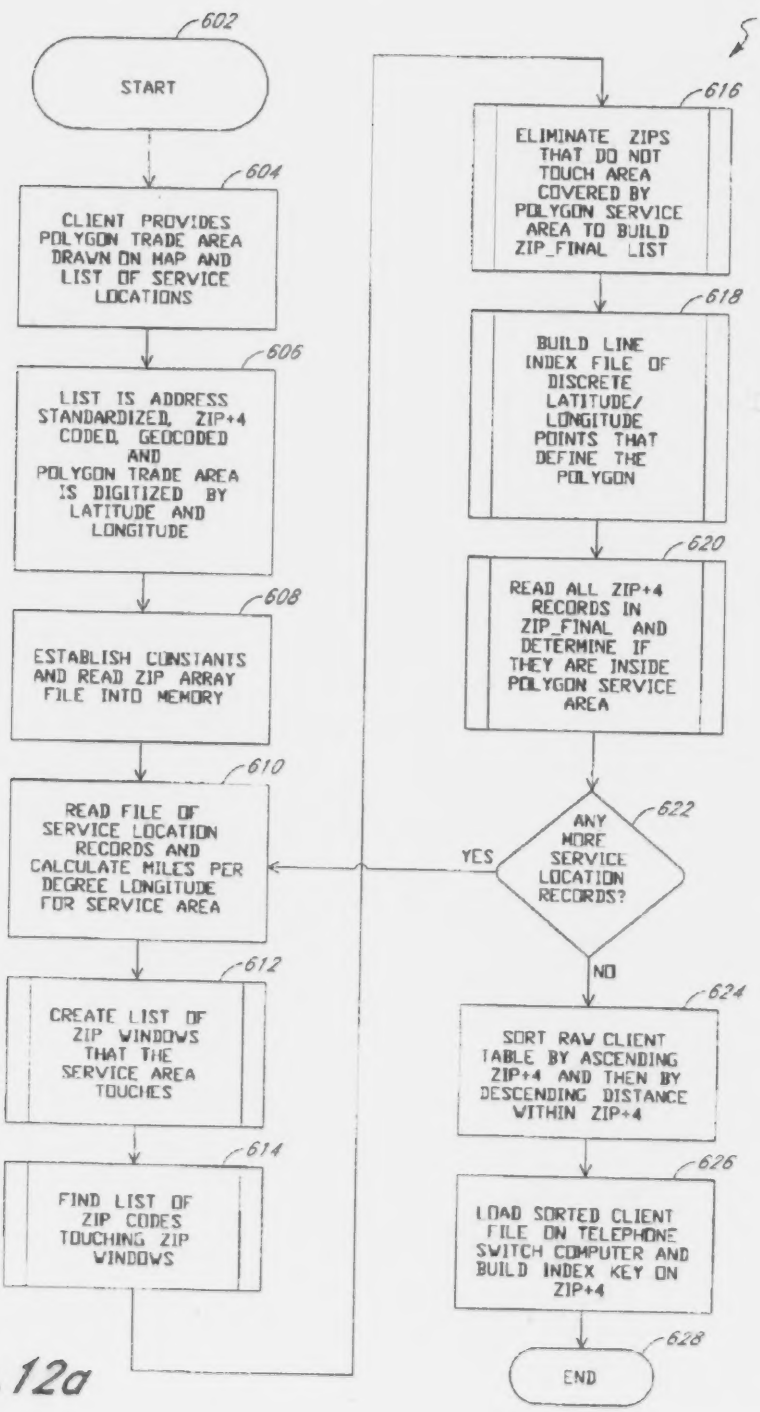
600
602
START
604
CLIENT PROVIDES POLYGON TRADE AREA DRAWN ON MAP AND LIST OF SERVICE LOCATIONS
606
LIST IS ADDRESS STANDARDIZED, ZIP+4 CODED, GEOCODED AND POLYGON TRADE AREA IS DIGITIZED BY LATITUDE AND LONGITUDE
608
ESTABLISH CONSTANTS AND READ ZIP ARRAY FILE INTO MEMORY
610
READ FILE OF SERVICE LOCATION RECORDS AND CALCULATE MILES PER DEGREE LONGITUDE FOR SERVICE AREA
612
CREATE LIST OF ZIP WINDOWS THAT THE SERVICE AREA TOUCHES
614
FIND LIST OF ZIP CODES TOUCHING ZIP WINDOWS
616
ELIMINATE ZIPS THAT DO NOT TOUCH AREA COVERED BY POLYGON SERVICE AREA TO BUILD ZIP_FINAL LIST
618
BUILD LINE INDEX FILE OF DISCRETE LATITUDE/ LONGITUDE POINTS THAT DEFINE THE POLYGON
620
READ ALL ZIP+4 RECORDS IN ZIP_FINAL AND DETERMINE IF THEY ARE INSIDE POLYGON SERVICE AREA
622
ANY MORE SERVICE LOCATION RECORDS?
YES
NO
624
SORT RAW CLIENT TABLE BY ASCENDING ZIP+4 AND THEN BY DESCENDING DISTANCE WITHIN ZIP+4
626
LOAD SORTED CLIENT FILE ON TELEPHONE SWITCH COMPUTER AND BUILD INDEX KEY ON ZIP+4
628
END

Fig. 12a

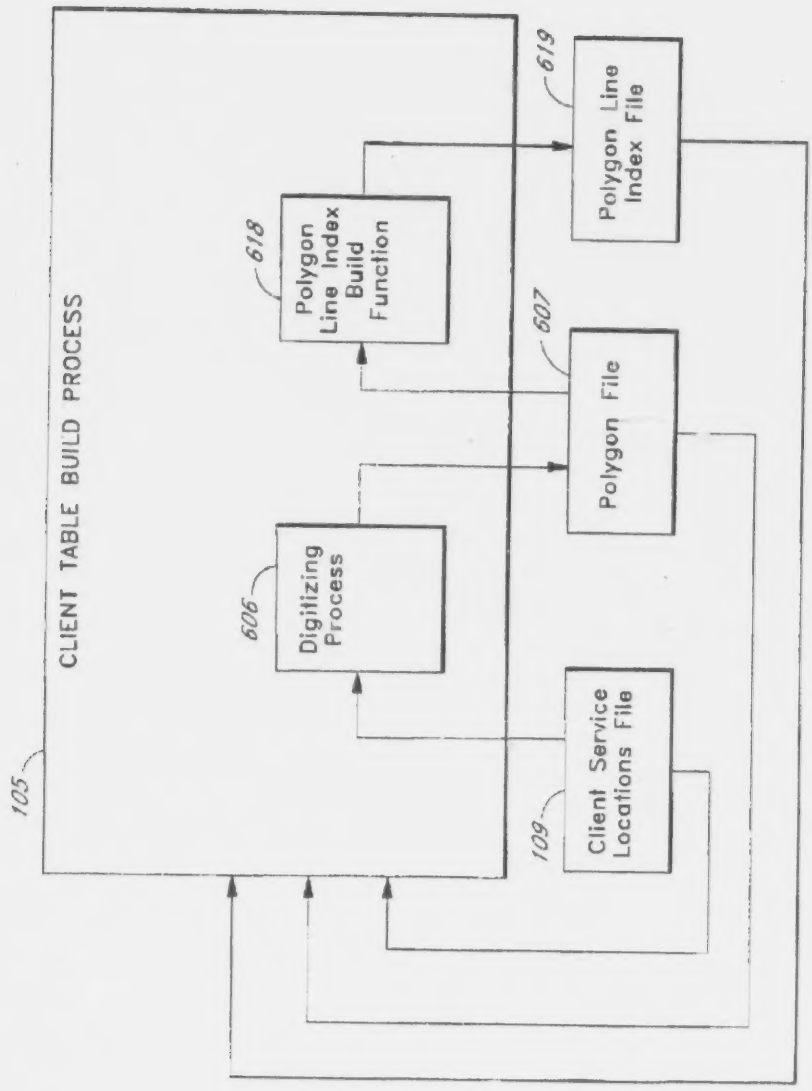
CLIENT TABLE BUILD PROCESS
105
Digitizing Process
606
Polygon Line Index Build Function
618
Client Service Locations File
109
Polygon File
607
Polygon Line Index File
619

Fig. 12b

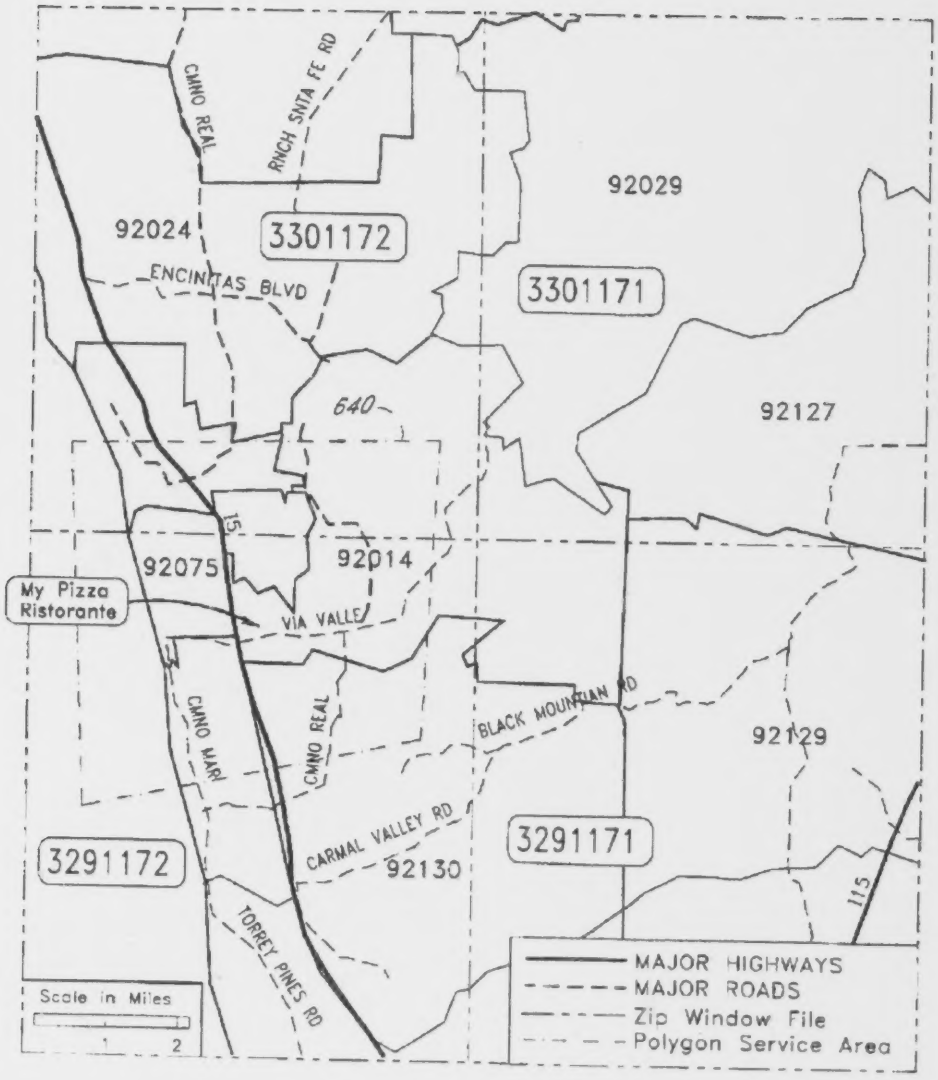
CMNO REAL
RNCH SNTA FE RD
92029
92024
3301172
ENCINITAS BLVD
3301171
640
92127
15
92075
92014
My Pizza Ristorante
VIA VALLE
CMNO MARI
CMNO REAL
BLACK MOUNTAIN RD
92129
CARMAL VALLEY RD
3291172
92130
3291171
TORREY PINES RD
115
Scale in Miles
1 2
MAJOR HIGHWAYS
MAJOR ROADS
Zip Window File
Polygon Service Area

Fig. 13

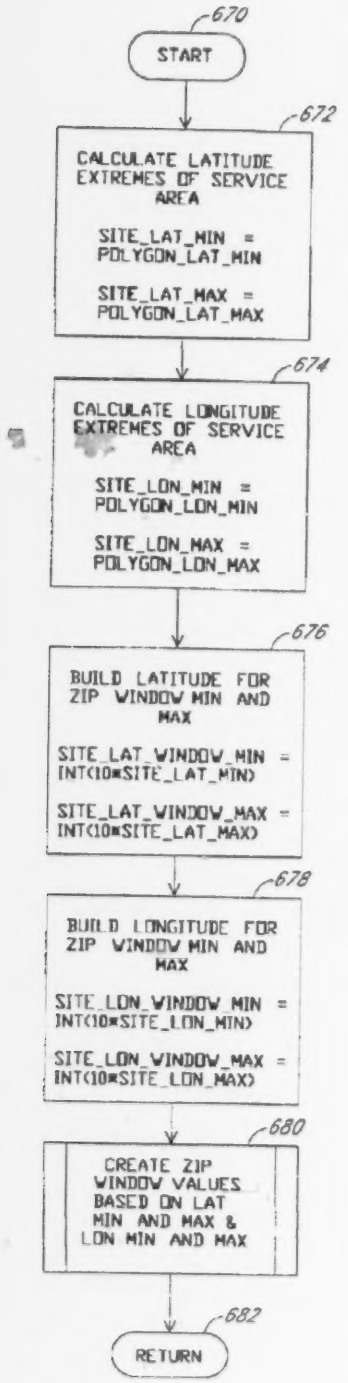
670
START
612
672
CALCULATE LATITUDE EXTREMES OF SERVICE AREA
SITE_LAT_MIN = POLYGON_LAT_MIN
SITE_LAT_MAX = POLYGON_LAT_MAX
674
CALCULATE LONGITUDE EXTREMES OF SERVICE AREA
SITE_LON_MIN = POLYGON_LON_MIN
SITE_LON_MAX = POLYGON_LON_MAX
676
BUILD LATITUDE FOR ZIP WINDOW MIN AND MAX
SITE_LAT_WINDOW_MIN = INT(10*SITE_LAT_MIN)
SITE_LAT_WINDOW_MAX = INT(10*SITE_LAT_MAX)
678
BUILD LONGITUDE FOR ZIP WINDOW MIN AND MAX
SITE_LON_WINDOW_MIN = INT(10*SITE_LON_MIN)
SITE_LON_WINDOW_MAX = INT(10*SITE_LON_MAX)
680
CREATE ZIP WINDOW VALUES BASED ON LAT MIN AND MAX & LON MIN AND MAX
682
RETURN

Fig. 14

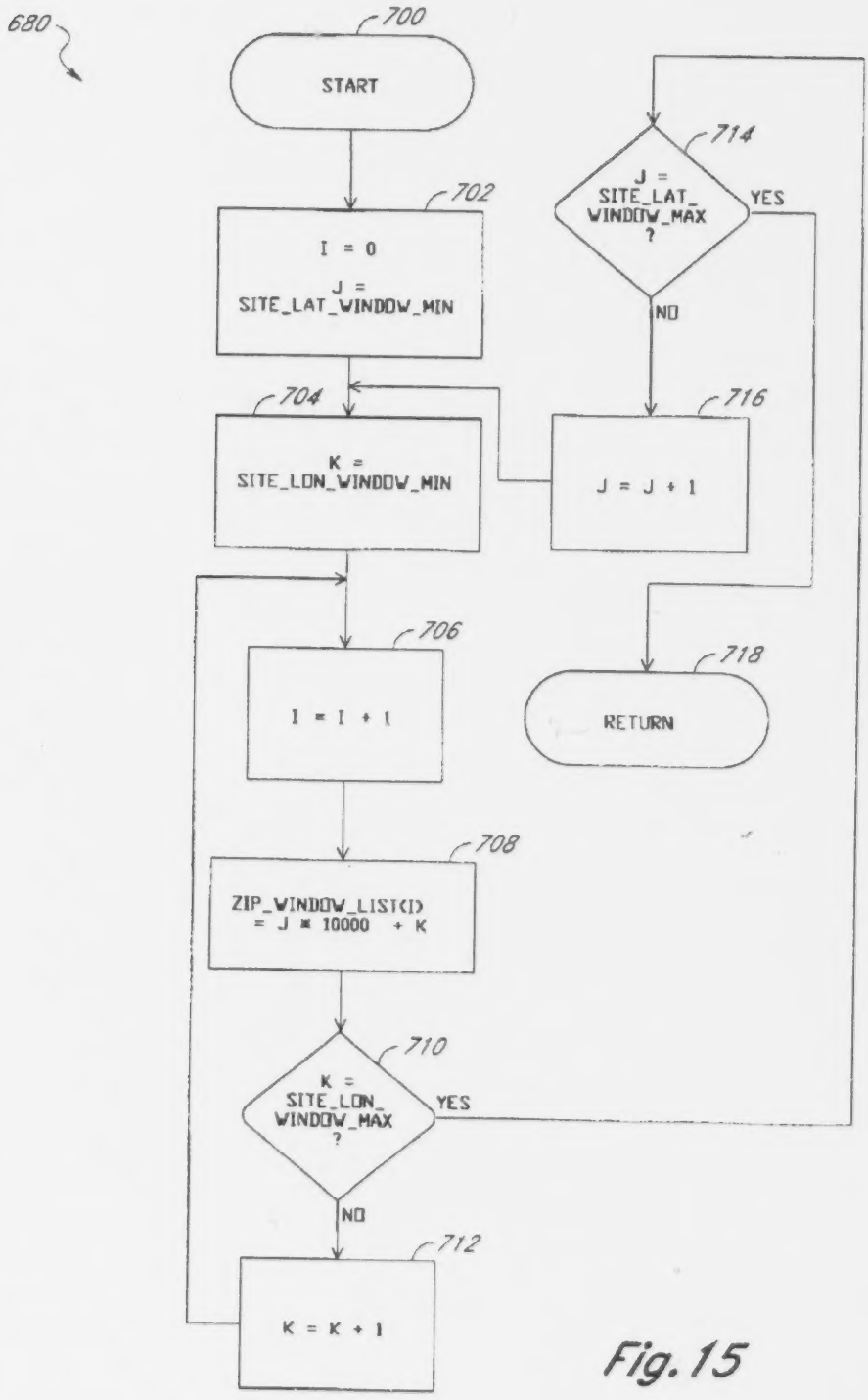
680
700
START
702
I = 0
J = SITE_LAT_WINDOW_MIN
704
K = SITE_LON_WINDOW_MIN
706
I = I + 1
708
ZIP_WINDOW_LIST(I) = J * 10000 + K
710
K = SITE_LON_WINDOW_MAX ?
YES
NO
712
K = K + 1
714
J = SITE_LAT_WINDOW_MAX ?
YES
NO
716
J = J + 1
718
RETURN

Fig. 15

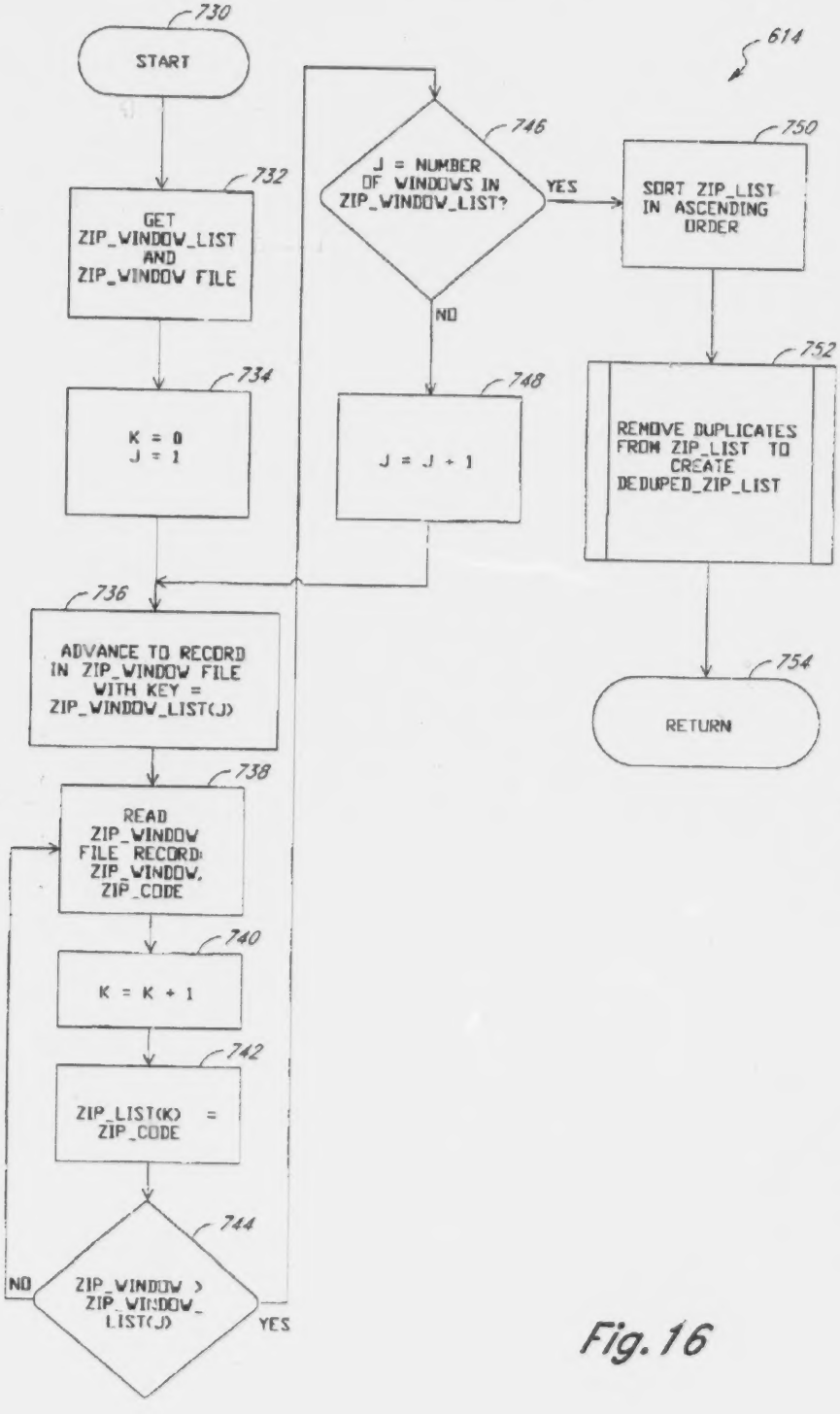
730
START
614
732
GET ZIP_WINDOW_LIST AND ZIP_WINDOW FILE
734
K = 0
J = 1
736
ADVANCE TO RECORD IN ZIP_WINDOW FILE WITH KEY = ZIP_WINDOW_LIST(J)
738
READ ZIP_WINDOW FILE RECORD: ZIP_WINDOW, ZIP_CODE
740
K = K + 1
742
ZIP_LIST(K) = ZIP_CODE
744
ZIP_WINDOW > ZIP_WINDOW_LIST(J)
NO
YES
746
J = NUMBER OF WINDOWS IN ZIP_WINDOW_LIST?
YES
NO
748
J = J + 1
750
SORT ZIP_LIST IN ASCENDING ORDER
752
REMOVE DUPLICATES FROM ZIP_LIST TO CREATE DEDUPED_ZIP_LIST
754
RETURN

Fig. 16

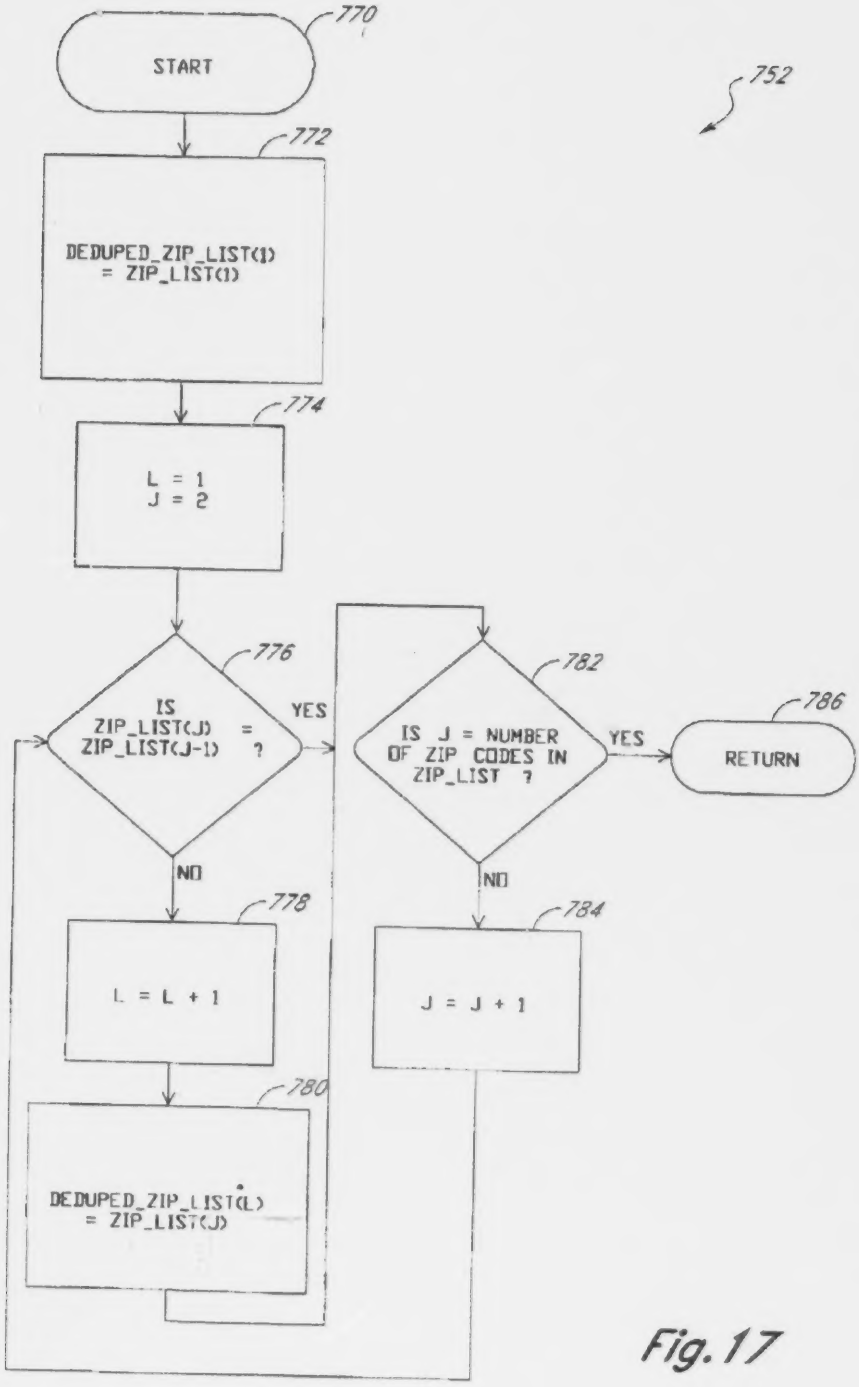
770
START
752
772
DEDUPED_ZIP_LIST(1) = ZIP_LIST(1)
774
L = 1
J = 2
776
IS ZIP_LIST(J) = ZIP_LIST(J-1) ?
YES
NO
778
L = L + 1
780
DEDUPED_ZIP_LIST(L) = ZIP_LIST(J)
782
IS J = NUMBER OF ZIP CODES IN ZIP_LIST ?
YES
NO
784
J = J + 1
786
RETURN

Fig. 17

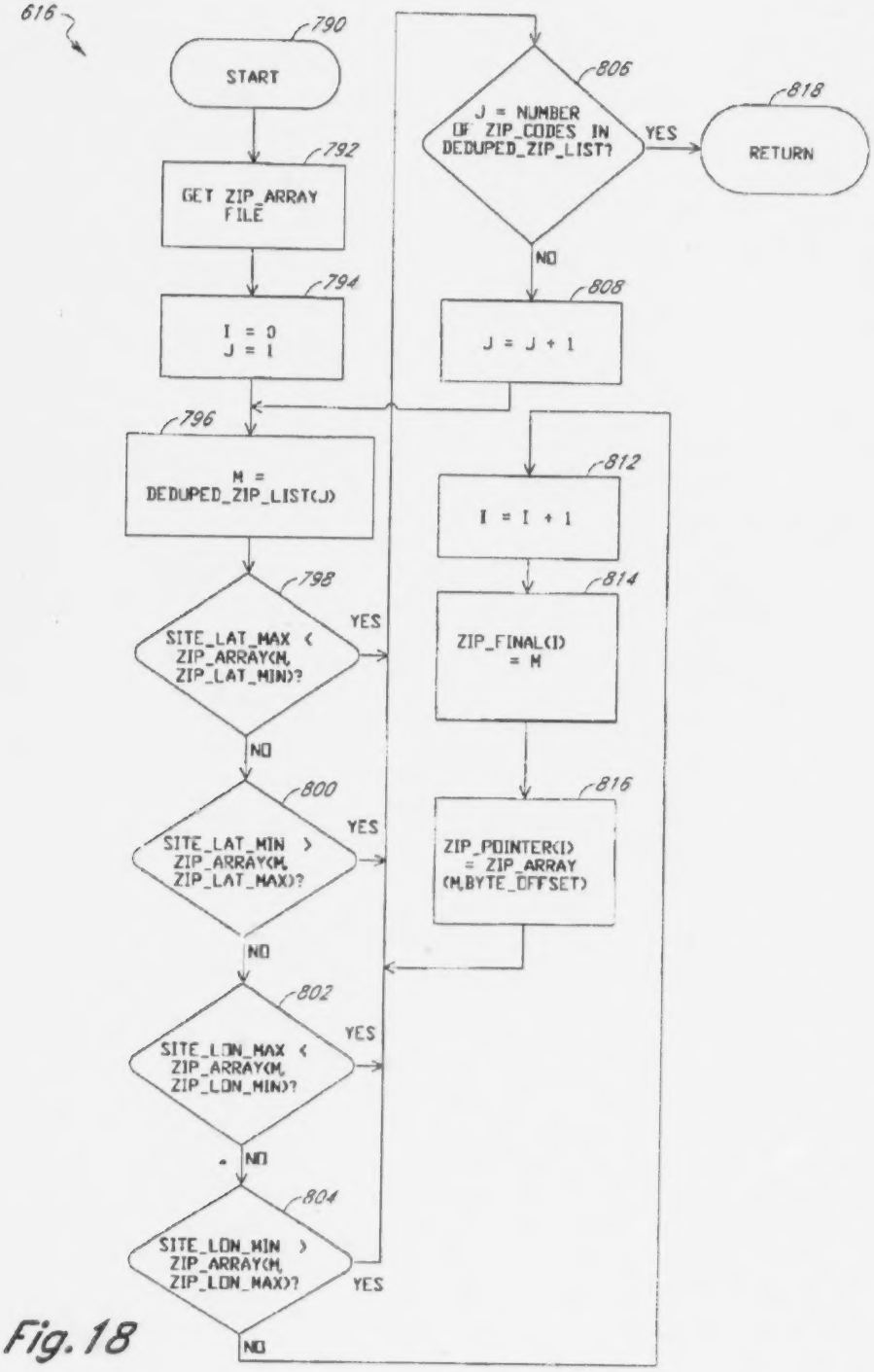
616
790
START
792
GET ZIP_ARRAY FILE
794
I = 0
J = 1
796
M = DEDUPED_ZIP_LIST(J)
798
SITE_LAT_MAX < ZIP_ARRAY(M, ZIP_LAT_MIN)?
YES
NO
800
SITE_LAT_MIN > ZIP_ARRAY(M, ZIP_LAT_MAX)?
YES
NO
802
SITE_LON_MAX < ZIP_ARRAY(M, ZIP_LON_MIN)?
YES
NO
804
SITE_LON_MIN > ZIP_ARRAY(M, ZIP_LON_MAX)?
YES
NO
806
J = NUMBER OF ZIP_CODES IN DEDUPED_ZIP_LIST?
YES
NO
808
J = J + 1
812
I = I + 1
814
ZIP_FINAL(I) = M
816
ZIP_POINTER(I) = ZIP_ARRAY (M,BYTE_OFFSET)
818
RETURN

Fig. 18

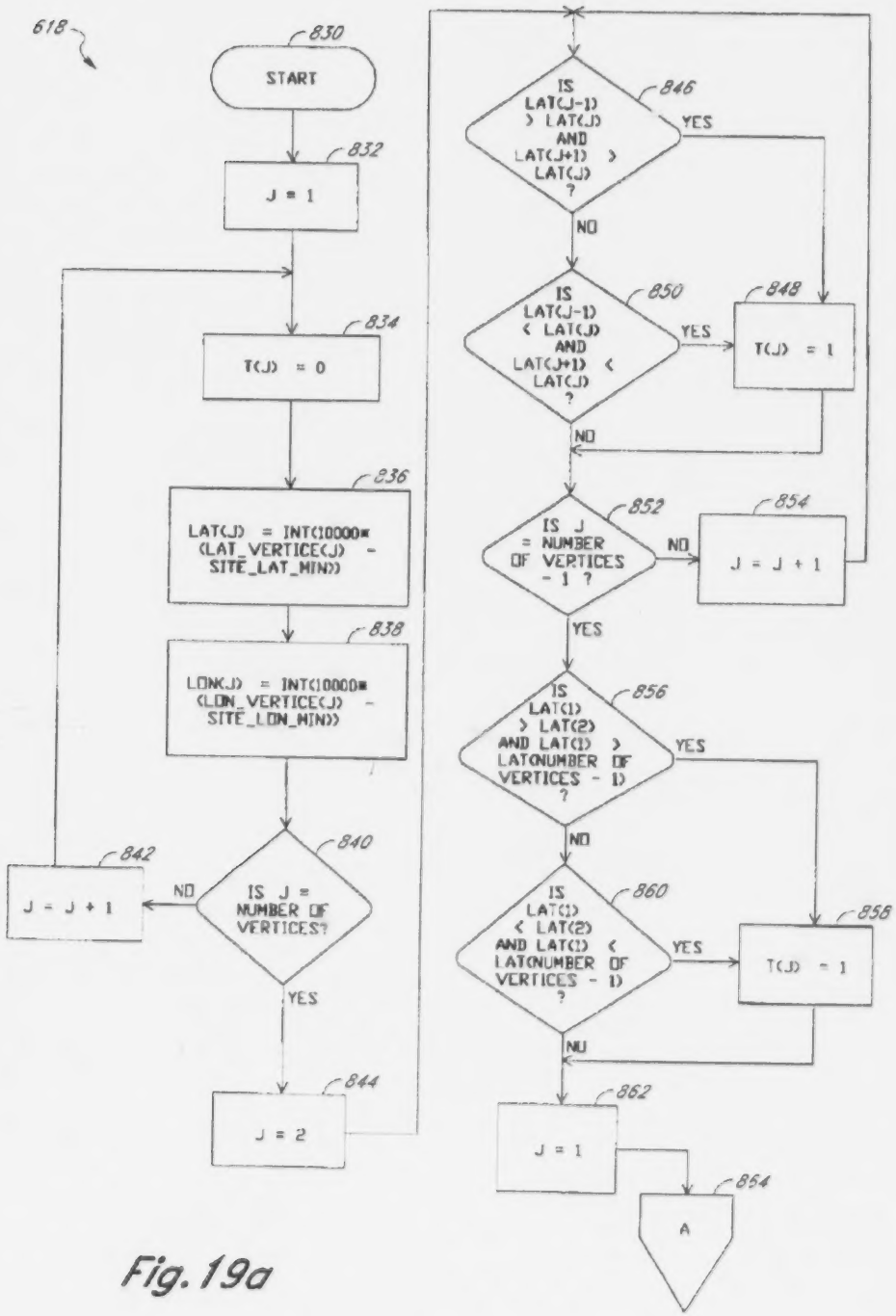
618
830
START
832
J = 1
834
T(J) = 0
836
LAT(J) = INT(10000*(LAT_VERTICE(J) - SITE_LAT_MIN))
838
LON(J) = INT(10000*(LON_VERTICE(J) - SITE_LON_MIN))
840
IS J = NUMBER OF VERTICES?
NO
842
J = J + 1
YES
844
J = 2
846
IS LAT(J-1) > LAT(J) AND LAT(J+1) > LAT(J) ?
YES
NO
848
T(J) = 1
850
IS LAT(J-1) < LAT(J) AND LAT(J+1) < LAT(J) ?
YES
NO
852
IS J = NUMBER OF VERTICES - 1 ?
NO
854
J = J + 1
YES
856
IS LAT(1) > LAT(2) AND LAT(1) > LAT(NUMBER OF VERTICES - 1) ?
YES
NO
858
T(J) = 1
860
IS LAT(1) < LAT(2) AND LAT(1) < LAT(NUMBER OF VERTICES - 1) ?
YES
NO
862
J = 1
864
A

Fig. 19a

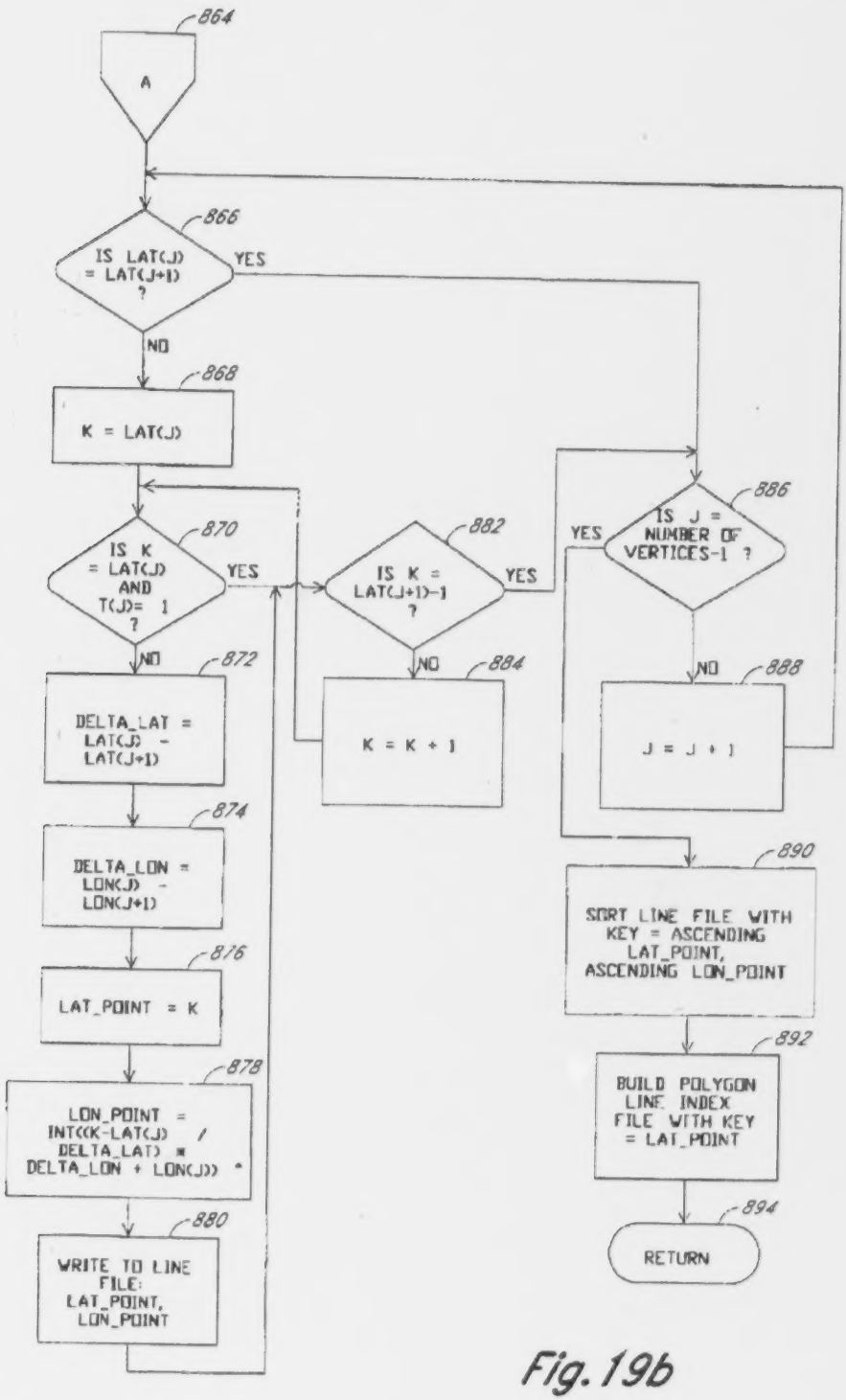
864
A
866
IS LAT(J) = LAT(J+1) ?
YES
NO
868
K = LAT(J)
870
IS K = LAT(J) AND T(J)= 1 ?
YES
NO
872
DELTA_LAT = LAT(J) - LAT(J+1)
874
DELTA_LON = LON(J) - LON(J+1)
876
LAT_POINT = K
878
LON_POINT = INT((K-LAT(J)) / DELTA_LAT) * DELTA_LON + LON(J))
880
WRITE TO LINE FILE: LAT_POINT, LON_POINT
882
IS K = LAT(J+1)-1 ?
YES
NO
884
K = K + 1
886
IS J = NUMBER OF VERTICES-1 ?
YES
NO
888
J = J + 1
890
SORT LINE FILE WITH KEY = ASCENDING LAT_POINT, ASCENDING LON_POINT
892
BUILD POLYGON LINE INDEX FILE WITH KEY = LAT_POINT
894
RETURN

Fig. 19b

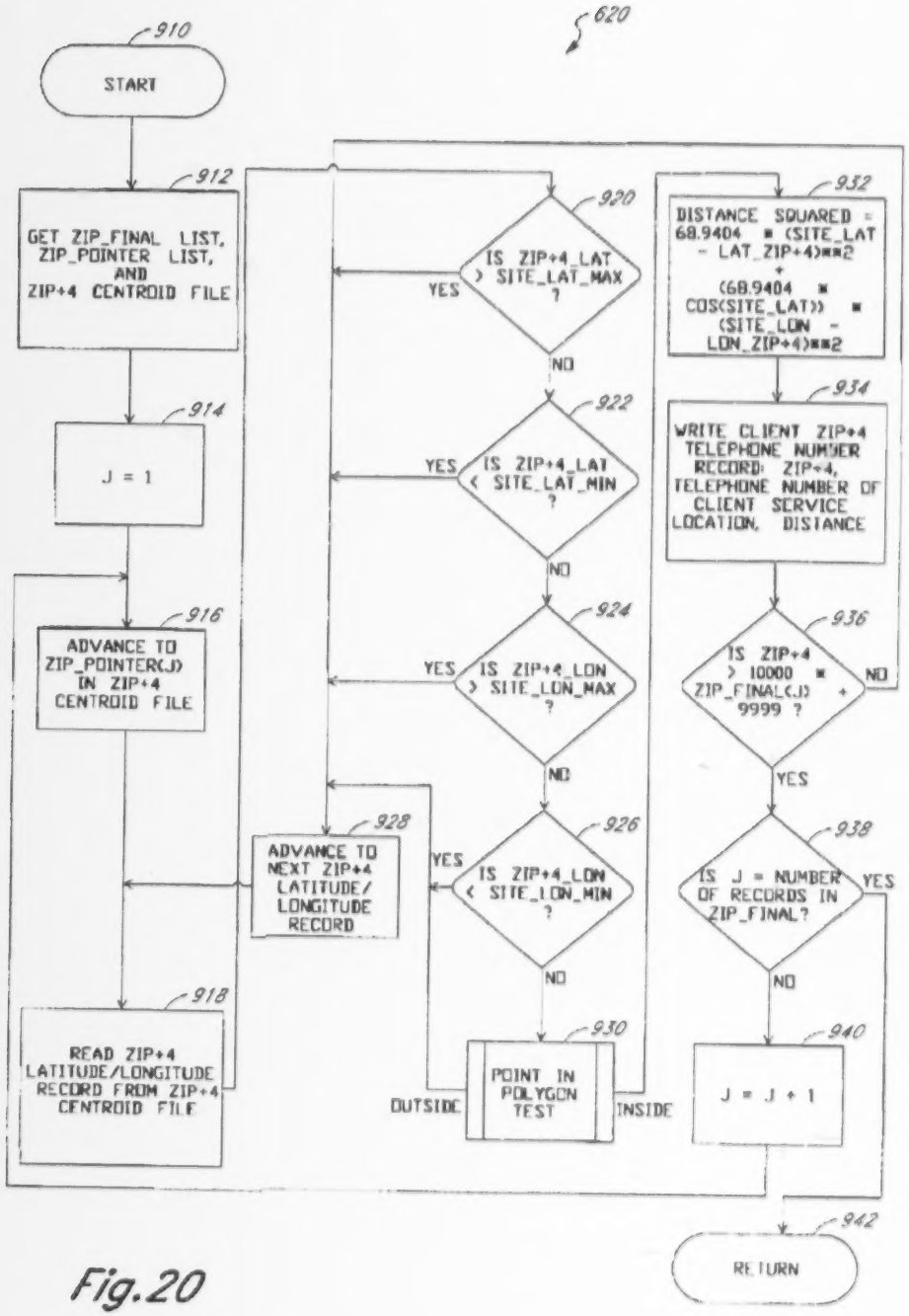
620
910
START
912
GET ZIP_FINAL LIST, ZIP_POINTER LIST, AND ZIP+4 CENTROID FILE
914
J = 1
916
ADVANCE TO ZIP_POINTER(J) IN ZIP+4 CENTROID FILE
918
READ ZIP+4 LATITUDE/LONGITUDE RECORD FROM ZIP+4 CENTROID FILE
920
IS ZIP+4_LAT > SITE_LAT_MAX ?
YES
NO
922
IS ZIP+4_LAT < SITE_LAT_MIN ?
YES
NO
924
IS ZIP+4_LON > SITE_LON_MAX ?
YES
NO
926
IS ZIP+4_LON < SITE_LON_MIN ?
YES
NO
928
ADVANCE TO NEXT ZIP+4 LATITUDE/ LONGITUDE RECORD
930
POINT IN POLYGON TEST
OUTSIDE
INSIDE
932
DISTANCE SQUARED = 68.9404 * (SITE_LAT - LAT_ZIP+4)**2 + (68.9404 * COS(SITE_LAT)) * (SITE_LON - LON_ZIP+4)**2
934
WRITE CLIENT ZIP+4 TELEPHONE NUMBER RECORD: ZIP+4, TELEPHONE NUMBER OF CLIENT SERVICE LOCATION, DISTANCE
936
IS ZIP+4 > 10000 * ZIP_FINAL(J) + 9999 ?
NO
YES
938
IS J = NUMBER OF RECORDS IN ZIP_FINAL?
YES
NO
940
J = J + 1
942
RETURN

Fig.20

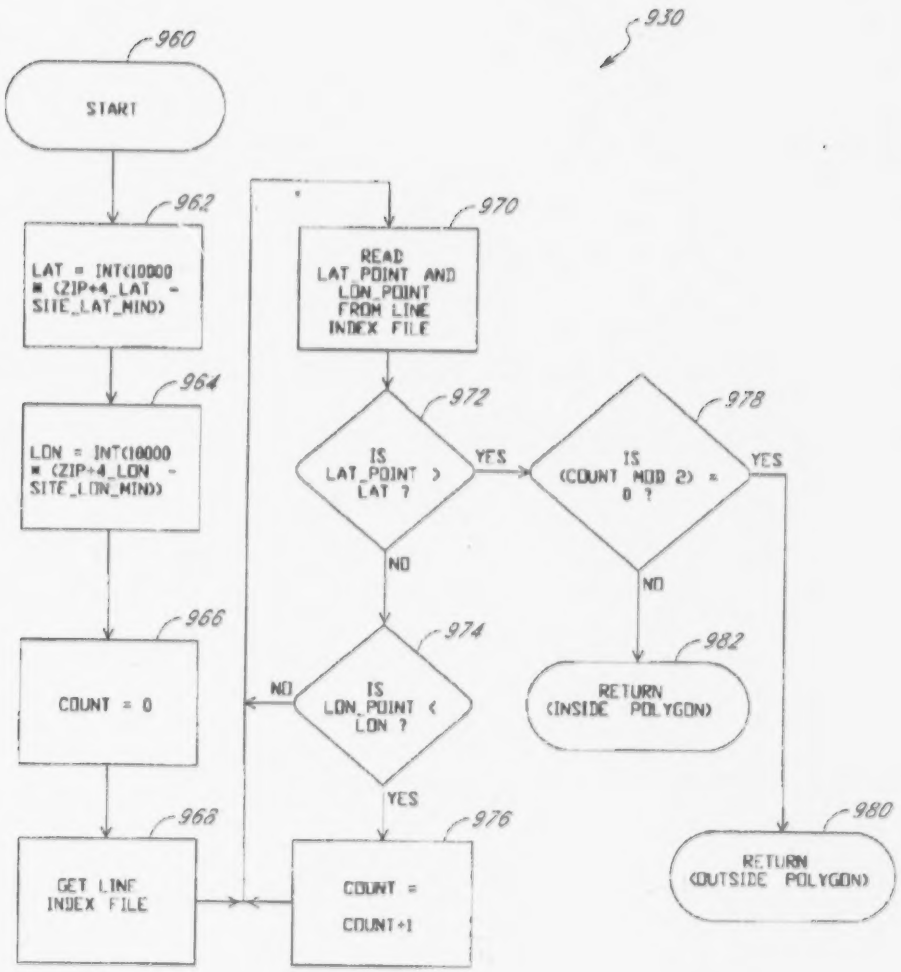
930
960
START
962
LAT = INT(10000 * (ZIP+4_LAT - SITE_LAT_MIN))
964
LON = INT(10000 * (ZIP+4_LON - SITE_LON_MIN))
966
COUNT = 0
968
GET LINE INDEX FILE
970
READ LAT_POINT AND LON_POINT FROM LINE INDEX FILE
972
IS LAT_POINT > LAT ?
YES
NO
974
IS LON_POINT < LON ?
NO
YES
976
COUNT = COUNT+1
978
IS (COUNT MOD 2) = 0 ?
YES
NO
980
RETURN (OUTSIDE POLYGON)
982
RETURN (INSIDE POLYGON)

Fig.21

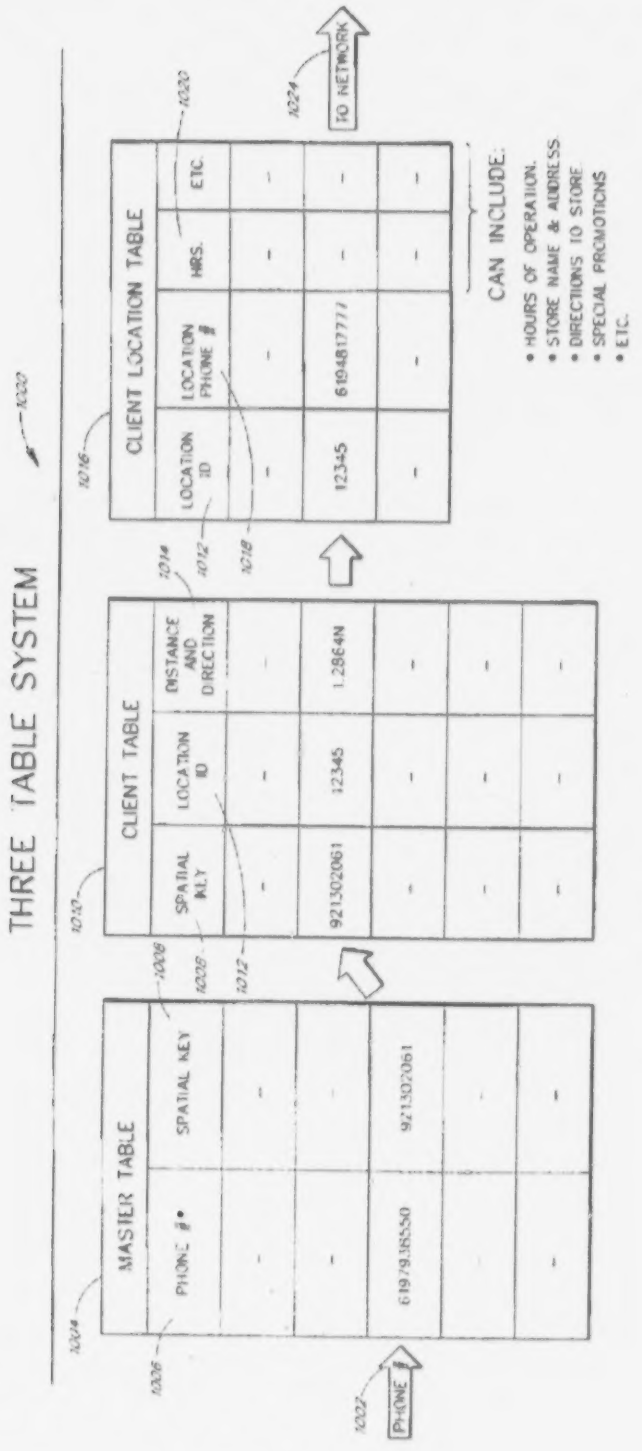
THREE TABLE SYSTEM
1000
MASTER TABLE
PHONE #
SPATIAL KEY
619793850
9213020
1004
1006
1026
1028
1027
PHONE #
CLIENT TABLE
SPATIAL KEY
LOCATION ID
DISTANCE AND DIRECTION
9213020
12345
1.2864N
1010
1012
1014
1018
CLIENT LOCATION TABLE
LOCATION ID
LOCATION PHONE #
HRS.
ETC.
12345
6194817777
1016
1020
1024
TO NETWORK
CAN INCLUDE:
• HOURS OF OPERATION.
• STORE NAME & ADDRESS
• DIRECTIONS TO STORE
• SPECIAL PROMOTIONS
• ETC.

FIG. 22

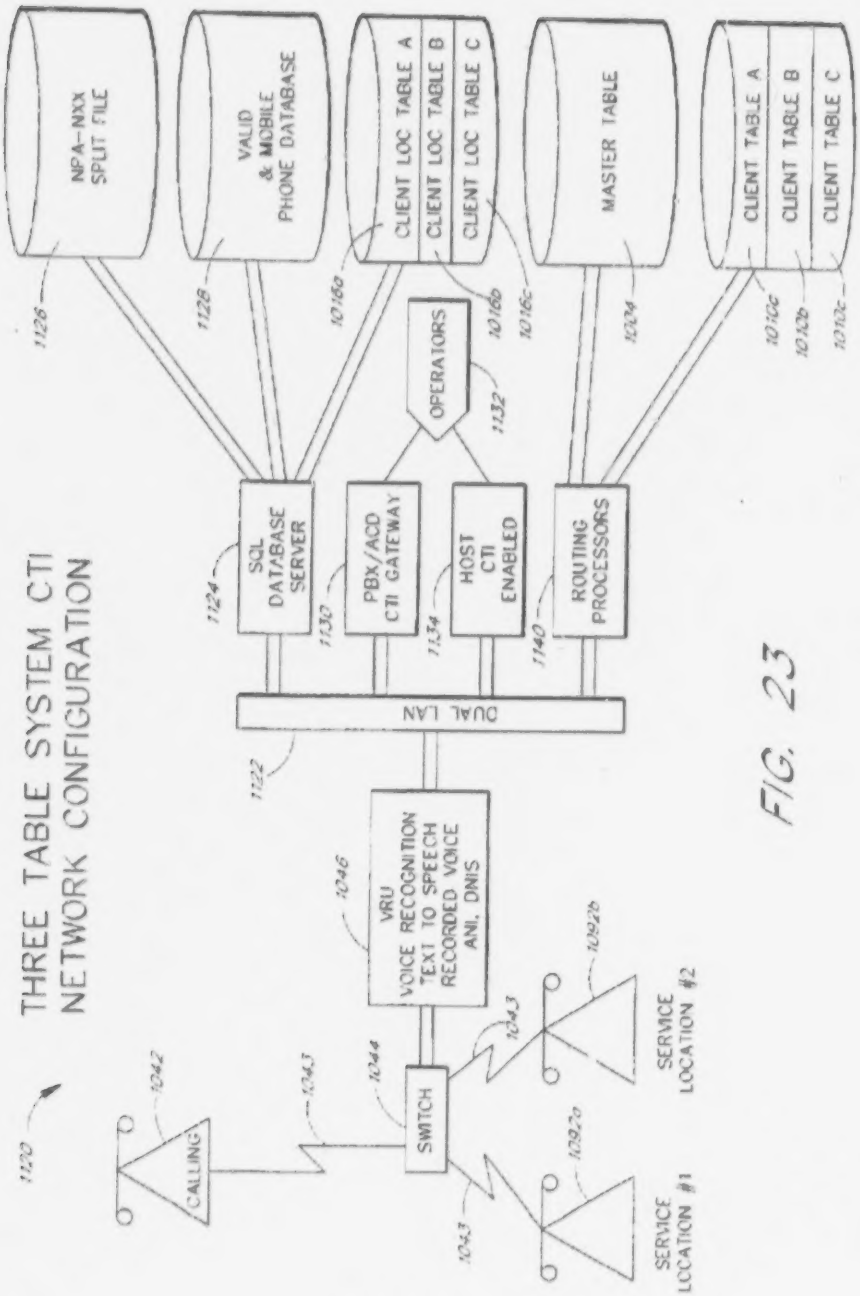
THREE TABLE SYSTEM CTI
NETWORK CONFIGURATION
1120
NPA-NXX SPLIT FILE
1126
VALID & MOBILE PHONE DATABASE
1128
CLIENT LOC TABLE A
CLIENT LOC TABLE B
CLIENT LOC TABLE C
10160
10160b
10160c
MASTER TABLE
1024
CLIENT TABLE A
CLIENT TABLE B
CLIENT TABLE C
10102c
10102b
10102c
OPERATORS
1132
SQL DATABASE SERVER
1124
PBX/ACD CTI GATEWAY
1130
HOST CTI ENABLED
1134
ROUTING PROCESSORS
1140
DUAL LAN
1122
VRU VOICE RECOGNITION TEXT TO SPEECH RECORDED VOICE ANI, DNIS
1046
SWITCH
1044
CALLING
1042
1043
1043
1043
SERVICE LOCATION #1
10420
SERVICE LOCATION #2
10420

FIG. 23

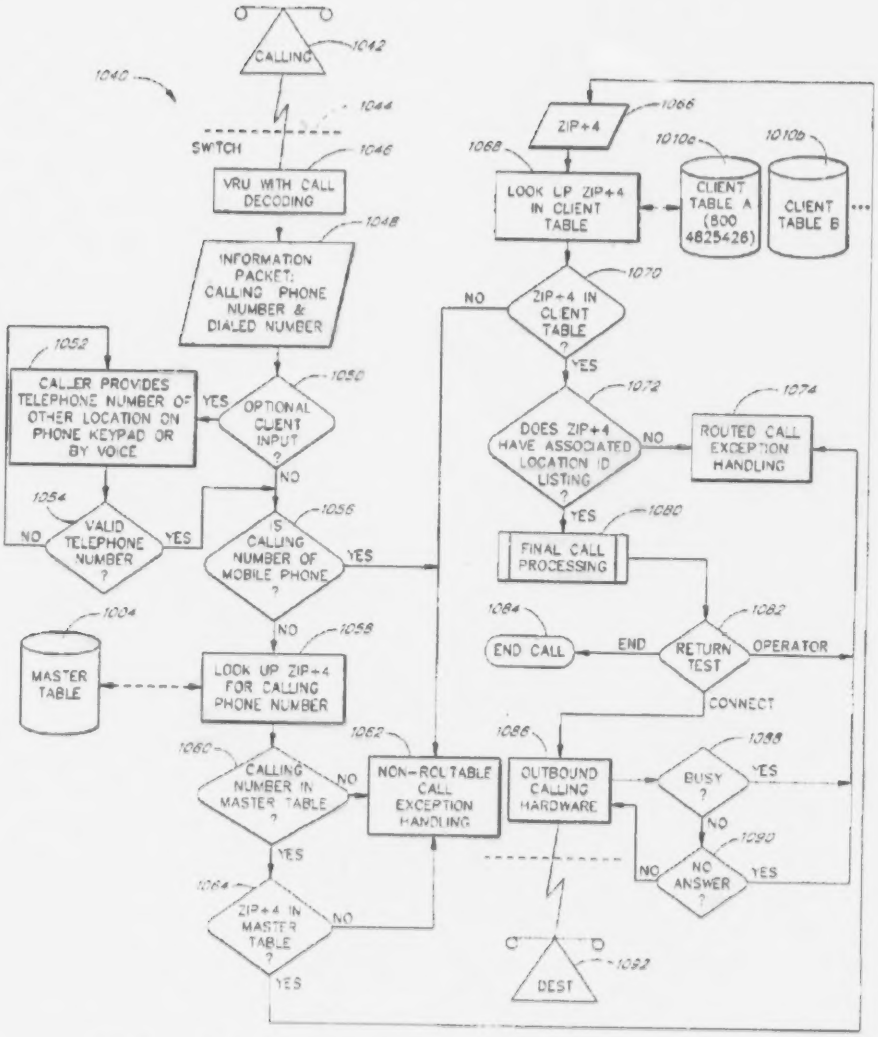
CALLING
1042
1040
1044
SWITCH
1046
VRU WITH CALL DECODING
1048
INFORMATION PACKET: CALLING PHONE NUMBER & DIALED NUMBER
1052
CALLER PROVIDES TELEPHONE NUMBER OF OTHER LOCATION ON PHONE KEYPAD OR BY VOICE
YES
1050
OPTIONAL CLIENT INPUT ?
NO
1054
VALID TELEPHONE NUMBER ?
NO
YES
1056
IS CALLING NUMBER OF MOBILE PHONE ?
YES
NO
1004
MASTER TABLE
1058
LOOK UP ZIP+4 FOR CALLING PHONE NUMBER
1060
CALLING NUMBER IN MASTER TABLE ?
NO
YES
1064
ZIP+4 IN MASTER TABLE ?
NO
YES
1062
NON-ROUTABLE CALL EXCEPTION HANDLING
1066
ZIP+4
1068
LOOK UP ZIP+4 IN CLIENT TABLE
1010a
CLIENT TABLE A (800 4825426)
1010b
CLIENT TABLE B
1070
ZIP+4 IN CLIENT TABLE ?
NO
YES
1072
DOES ZIP+4 HAVE ASSOCIATED LOCATION ID LISTING ?
NO
1074
ROUTED CALL EXCEPTION HANDLING
YES
1080
FINAL CALL PROCESSING
1084
END CALL
END
1082
RETURN TEST
OPERATOR
CONNECT
1086
OUTBOUND CALLING HARDWARE
1088
BUSY ?
YES
NO
1090
NO ANSWER ?
NO
YES
C
D
1092
DEST

FIG. 24

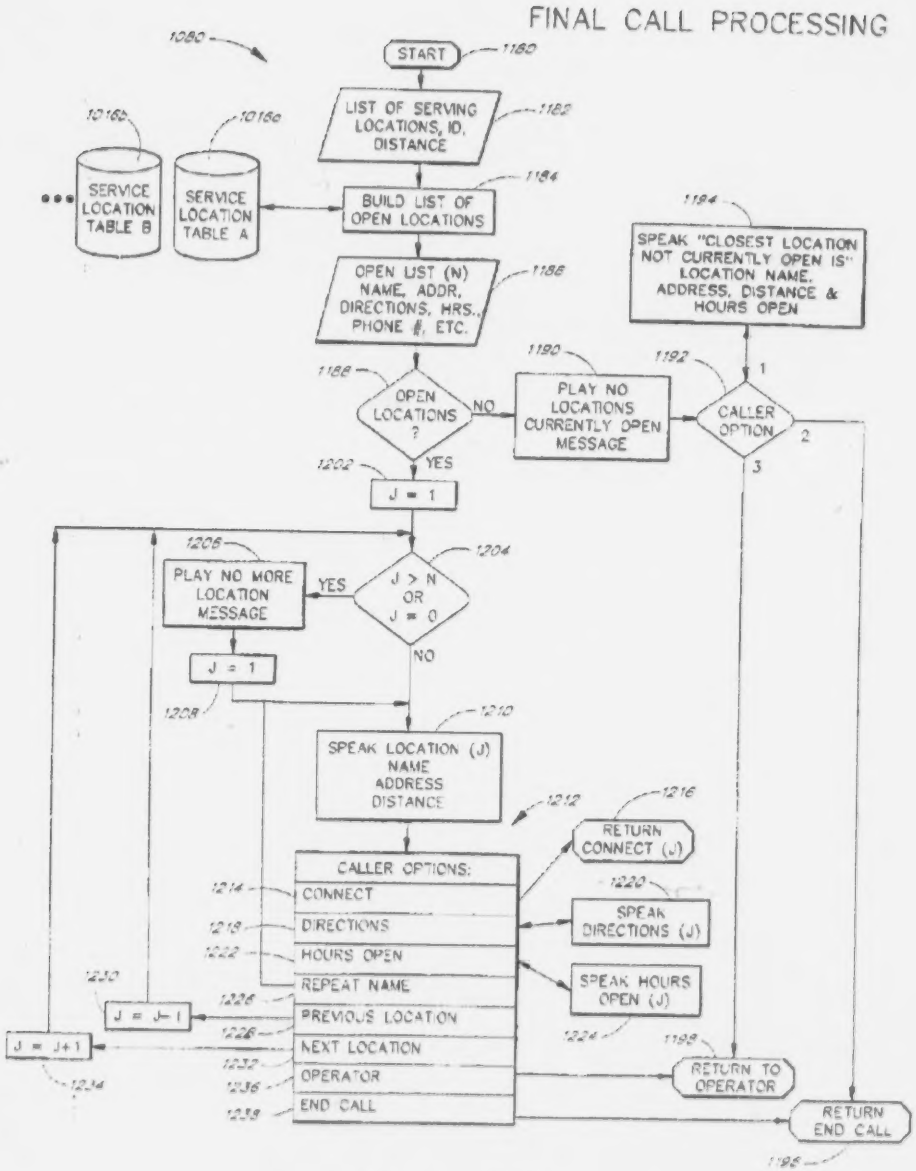
FINAL CALL PROCESSING
1080
START
1180
LIST OF SERVING LOCATIONS, ID, DISTANCE
1182
1016B
1016A
SERVICE LOCATION TABLE B
SERVICE LOCATION TABLE A
BUILD LIST OF OPEN LOCATIONS
1184
OPEN LIST (N) NAME, ADDR, DIRECTIONS, HRS., PHONE #, ETC.
1186
1184
SPEAK "CLOSEST LOCATION NOT CURRENTLY OPEN IS" LOCATION NAME, ADDRESS, DISTANCE & HOURS OPEN
1188
OPEN LOCATIONS ?
NO
1190
PLAY NO LOCATIONS CURRENTLY OPEN MESSAGE
1192
CALLER OPTION
1
2
3
YES
1202
J = 1
1206
PLAY NO MORE LOCATION MESSAGE
YES
1204
J > N OR J = 0
NO
J = 1
1208
1210
SPEAK LOCATION (J) NAME ADDRESS DISTANCE
1212
1216
RETURN CONNECT (J)
CALLER OPTIONS:
1214
CONNECT
1218
DIRECTIONS
1222
HOURS OPEN
REPEAT NAME
1226
PREVIOUS LOCATION
1228
NEXT LOCATION
1232
OPERATOR
1236
END CALL
1238
1220
SPEAK DIRECTIONS (J)
SPEAK HOURS OPEN (J)
1224
1230
J = J-1
J = J+1
1234
1198
RETURN TO OPERATOR
RETURN END CALL
1196

FIG. 25

AUTOMATIC INFORMATION AND ROUTING SYSTEM FOR TELEPHONIC SERVICES

RELATED APPLICATION

This is a continuation-in-part of application Ser. No. 08/365,325, filed on Dec. 28, 1994 and issued as U.S. Pat. No. 5,506,897 on Apr. 9, 1996, which is a continuation of 08/020,653, filed Feb. 22, 1993, now abandoned.

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention generally relates to telephonic services and routing technologies and, more specifically, to a system for automatically providing information about a client location and optionally routing telephone calls.

Background of the Invention

In the increasingly competitive business world, there have been various attempts to automatically route telephone calls made to an "1-800" number or equivalent for a local store, franchise, branch, dealer or service company (henceforth, service location), whose service area encompasses the caller location for the product or service associated with the "1-800" number. For example, a person would dial 1-800-Italian from any telephone in the United States, and the phone would ring at the MyPizza (a fictitious business) service location that delivers pizza to the location of the calling telephone.

There have been several previous simplistic attempts to automatically route calls to a service location that is geographically proximate to the caller. These routing technologies are based on routing the incoming call to a location with the same telephone area code and prefix as the originating call, to the same 5-digit zip code, to all zip codes that have the same city name, or a combination of the above. There are many different terms used to describe the various components of a 10-digit telephone number. In the telecommunications industry, it is called the NPA-NXX-XXXX, where the NPA is the area code, the NXX is the prefix or exchange and the XXXX is the suffix or line number. For example, in the 10-digit telephone number 619-942-9999, 619 is the NPA or area code; 942 is the NXX, prefix or exchange, and 9999 is the XXXX, suffix or line number. Usually all telephone numbers with the same area code and prefix are serviced by the same wire center. A wire center is the geographical area serviced by a single telephone company office. The wire center is usually one switch, but can be multiple switches, and usually provides service to about ten exchanges. By definition of the telephone companies, wire centers do not overlap.

A. Prior Routing System Structure

The earth is a sphere, and any point on its surface can be defined by a latitude and longitude spherical coordinate system developed several centuries ago. Using this coordinate system, spherical trigonometry, and a computer, it is possible to calculate the distance between any two locations on the earth and determine if one location lies within a specified radius of another or determine if a location is contained within an irregular service area defined as a spherical polygon.

Several years ago, AT&T instituted the technology of passing the calling telephone number along the telephone network, by use of Automatic Number Identification (ANI),

to facilitate billing. The "Caller ID" feature, available on some telephone networks, utilizes the ANI technology to identify the telephone number of the calling party. Since a modern telephone switch is just a special purpose computer, it is a simple process for the switch handling the call to look up in a record table (of over one hundred million records) the calling telephone number with an assigned service location telephone number and route the call to the service telephone number.

However, there were some fairly formidable problems that needed to be solved before this routing process could be a commercially viable and practical service. The first problem was initially determining the latitude and longitude of every telephone number in the United States and keeping them updated when twenty percent of the consumer population moves every year and businesses are continually opening and closing locations. The second problem was performing the multitude of spherical trigonometric calculations which is several orders of magnitude beyond today's most powerful computers that are required to create the calling telephone number to the service location telephone number tables and to keep them updated in a constantly changing environment.

Several key databases and technologies are necessary to solve these problems. The United States Census Bureau, as part of the 1990 census, built a national latitude and longitude cartographic map of the United States called TIGER (Topological Integrated Geographical Encoding and Referencing) that contains almost every street link in the United States. A street link is a street segment intersected by other streets at each end. The TIGER record for all street links contains the latitude and longitude coordinates at each end of the street segment accurate to within plus or minus thirty feet and, for most street segments, the starting and ending address ranges for each side of the street. Where the Census Bureau did not complete the address ranges, private companies have filled in the gaps and are updating TIGER as new streets are built.

In the past, the U.S. Postal Service (the "Post Office") divided the U.S. into postal delivery areas called zip (zone improvement plan) codes to help automate the routing of mail. At the nine digit level (called "zip+4"), these zip codes usually correspond to a single side of a street link. In addition to geographically dividing the United States into small postal delivery areas, the Post Office also set standards for the naming of places and streets. For direct mailers to get discounts, they had to standardize their mailing addresses to match the Post Office's naming conventions and provide a zip+4 code. To facilitate the process of postal address standardization and zip+4 coding, the Post Office provides a national Zip+4 Address Coding Guide and has certified several commercially available software packages that correctly address standardize and zip+4 code 99 percent plus of the address records on a Post Office test file.

Recently, the Post Office and some private companies have matched the Post Office's Zip+4 Address Coding Guide with TIGER and have created files containing zip+4 codes with latitude and longitude centroids (a zip+4 centroid is the approximate geographical mid-point of a zip+4 code). This type of file is referred to as a zip+4 latitude and longitude centroid file **100** (FIG. 1*a*). These centroids are accurate 95 percent of the time to within plus or minus 105 feet in relation to a house or business receiving mail at a street address assigned to a given zip+4 code. Today, it is a very reliable and economical process to address standardize and zip+4 code a list identifying physical locations, such as a master list of phone numbers of the present invention.

Other changes and improvements in telecommunications technology were needed to make the automated telephone call routing process a commercially viable and practical service. Improvements in the telecommunication infrastructure in the U.S. have changed the telecommunication cost structure. Presently the cost of a telephone call from Los Angeles to New York is about the same as for a call from Los Angeles to San Diego. Therefore, the physical location of a central routing switch is no longer critical, or in other words. can be anywhere in the continental U.S.

Another improvement of telecommunications technology is the advent of Geographic Information Systems, commonly called GIS. These systems allow the aggregation and display of almost any data for any area, any size or shape, anywhere in the United States by interactive maps. The popularity of these systems has lead to the development of sophisticated techniques and algorithms to handle geographically based information. Of primary interest is the linking of the geographic information to telephone numbers, especially at the 10-digit level.

The complex process of spherical trigonometric distance calculations on billions of possible permutations has been alleviated by making the process less computer intensive. Instead of performing complex trigonometric spherical calculations, a technique that is less than one-thousandth as computer intensive is used. This technique is based on doing a polyconic projection from each service location and performing simple two dimensional distance squared tests. There are approximately 68.9404 miles per degree latitude. However, the miles per degree longitude varies with the latitude. At a given latitude, the miles per degree longitude is equal to the cosine of the latitude multiplied by 68.9404. By using the service location as the latitude point and knowing the latitude and longitude of calling points, it is easy to obtain a delta latitude and longitude, translate them into miles, and perform a simple distance calculation, i.e., "distance=SQRT(X**2+Y**2)". This polyconic projection technique results in a distance calculation error of approximately 12 feet for two locations that are 100 miles apart at 40 degrees latitude. However, additional reduction of the computational effort is necessary to have a practical, efficient, and commercially viable routing process

B. Prior Routing System Operation

Previous technologies for routing "1-800" telephone number calls to a service location have one or more of the following three problems:

(1) Many such routing systems are very coarse in their level of precision and cannot handle small service areas with legally defined franchise territories like pizza delivery. A much more precise system is desired that is accurate to within 105 feet rather than previous accuracies to within 10miles. Such a system would utilize very precise distance calculations made possible by knowing the physical location on the earth, most typically expressed as a latitude and longitude, of nearly every non-mobile telephone in the United States. Other coordinate systems could be used in other countries. A business also may like the ability to route a telephone call to a specific franchise territory, which may be an irregularly shaped polygon.

(2) Another problem in routing systems is that they divide the United States into many large arbitrarily defined areas and there is no ability to route a call to the closest service location if the closest location is not located in the same artificially created area as the caller. In many instances, a caller located near the border of an exchange area or 5-digit zip code is much closer to a service location with a different zip code or telephone prefix than the one to which it is routed. A seamless system is desired that does not use artificially created areas such as telephone wire centers, telephone prefixes, or 5-digit zip codes where calls can only be routed within their area. A business may want an option of choosing to route a call to the closest branch or to any branch, for example, in a 5 mile radius of the caller.

(3) Finally, known routing systems often rely on third party telephone directories that are always outdated due to publishing, key entry, and optical character recognition (OCR) scanning time lags and which do not include unlisted numbers. Over 30 percent of the U.S. telephone numbers are unlisted, which includes public pay phones and multiple lines going into businesses and households where only one line is listed. Because consumers and businesses throughout the country change locations on a daily basis, a system is desired that correctly routes a much higher percentage of calls than the previous attempts. In the U.S., such a system would require direct access to the AT&T universe of telephone numbers. Such a system would preferably utilize daily updated and unlisted telephone numbers and involve passing information between regulated telephone databases maintained by the telephone companies and client databases maintained by third parties.

These three deficiencies result in lower customer service and satisfaction, higher costs because of manual exception handling for calls that cannot be routed due to a variety of reasons, costs of misrouting, and high on-going maintenance costs. Manual exception handling generally requires operator intervention in the "1-800" call.

Other previous systems require the consumer to enter their zip code or telephone prefix on the Touch Tone keypad in response to voice prompting from the system. Based on the caller-entered data on the keypad, the telephone call is forwarded to a destination telephone. Other similar systems will simply inform the consumer, by a voice message, of another telephone number for the local dealer, which must be manually dialed rather than forwarding the call automatically. A system is desired that does not require any additional customer interaction or input. Such a system would be totally automatic by utilizing, at a minimum, the 10-digit telephone numbers in the standard telephone packet that can only be accessed and utilized by regulated telephone companies on a national basis. The telephone packet includes the complete origin and destination telephone numbers.

The basis of an automatic telephone routing system must include a means to automatically identify the telephone number of the calling party. Such a system is disclosed by Kaplan, U.S. Pat. No. 5,163,087. This system translates an Automatic Number Identification (ANI) of the calling party into a customer database key previously defined by the called party. The database key, e.g., customer account number, is then provided to the called party instead of the ANI information such that a computer at the called business can process the key to look up and present customer information to an agent of the business. This system assumes that the caller has called this business at a previous time to provide information to the agent of the business to create a customer record or other similar information. The Kaplan system delivers the database key to one business location rather than a plurality of service locations throughout the country. The delivery of the database key to the business requires an Integrated Services Digital Network (ISDN) or similar facility, which is an additional burden for the business.

An automatic routing system should not need to deliver a database key or message to the final destination, but would merely utilize the ANI information as an index to a table

containing partitions of a country into small geographic areas, such as postal service zip+4 codes. These partitions would be further utilized to access one of a plurality of service locations that may be anywhere within the country.

A current system for telephone call routing is described in U.S. Pat. No. 4,757,267 to Riskin. Riskin employs automatic number identification (ANI) for routing calls from a caller to a dealer located within the same area code and prefix (first six digits of a 10-digit telephone number, the "6-digit number") as the caller. Because the area identified by the 6-digit number is fairly large and there may be several dealers within the area, the dealer location is usually selected from a list of several locations based on random selection, or weighted percentage assigned to each location. Alternatively, the caller is presented with a list of possible dealer locations for the large geographic area because the system does not know which service locations are closer than the others. Riskin uses the 6-digit number to determine the location of both the caller and the service location. Riskin assumes the location of the caller to be the location of the central office switch that services the caller's 6-digit exchange (which can be 0 to 5 miles from its true location), and assumes the location of the dealer location to be the location of the central office switch that services the dealer location's 6-digit exchange (which can be 0 to 5 miles from its true location) utilizing a coordinate system that is accurate to plus or minus 2300 feet. What is desired is a system that uses all ten digits of the calling and service location telephone numbers and the physical street address of the location of the numbers in connection with a GIS-type database (utilizing a coordinate system and associated coordinate data that is accurate to within 30 feet) to provide geographic precision to within 105 feet for the location of the calling and destination telephones.

Consequently there is a need for an automated telephone routing system that provides the ability to reduce costs by routing a very high percentage of calls made to a single national telephone number without any human intervention; the marketing advantage for a client of a single, easy to remember, toll free or nominal fee national telephone number; geographically precise results; and the ability of businesses to define custom service areas around each servicing location of any desired size and shape. Preferably, a client may define each location's service area as an area with a radius of any size or a polygon of any size and shape. A client can intermix radius and polygon definitions as well as have service areas be overlapping or non-overlapping.

Frequently, a caller may not need to have a telephone call actually completed to the service business location, but rather, the caller needs information about the business. For example, the caller may want to determine the location of the three closest service locations, or more specifically, the caller desires to know that the business is still open, or has inventory of a desired item, and so forth.

C. Prior Voice Response Unit Utilization

Traditionally, businesses, non-profit organizations and government agencies with one to tens of thousands of service locations provided customers multiple telephone number points of contact with usually at least one telephone number for each service location, department and individual. This put a major burden on customers and prospective customers to find, remember, dial and be connected to the correct intra-entity telephone number for the location or services desired. In the new world of electronic commerce, these entities have started advertising vanity telephone numbers as their preferred single initial point of customer contact. These vanity numbers are easy to remember telephone numbers, e.g., 1-800-FLORIST, that are selected by a business. The vanity telephone numbers typically have "800", "888" or "900" as area codes or local exchange prefixes "555" or "950".

Based on the large volume of calls going to these vanity numbers, customer demands for extended support hours of seven days a week and 24 hours a day, and the goal of reduced telephone busy and on-hold times has resulted in many vanity advertisers answering vanity number calls with Voice Response Units (VRU). The proliferation of vanity numbers and the utilization of the VRU have created a need to automate, through what is now called intelligent call processing, a higher percentage of calls being answered by the VRU.

In this context, automated intelligent call processing is defined as the capture of network-provided data, such as ANI and dialed number identification service (DNIS), and caller-provided data, such as data entered by Dual Tone Multi-Frequency (DTMF) through a Touch Tone telephone key pad or the caller speaking directly, at the VRU. The intelligent VRU further can decipher, validate, process and fulfill the caller's request by playing pre-recorded messages, creating call specific test messages and speaking them to the caller, and/or routing and connecting the caller to the servicing location. In contrast, semi-automated call processing means that components of the customer request can be automated through intelligent call processing but some portions of the request still require support during the call by a live operator.

For the VRU to handle a higher percentage of caller requests, more information must be immediately accessible to the VRU. This requires the real-time access to many different databases, stored on different computer systems. Recent advances in computer networking technology, networking standards, increases in speed and bandwidth, and reduction in costs for long distance data communications have made wide-area networking a common practice. This is demonstrated in part by the variety of computer-interface applications supported by computer network services, such as CompuServe, America Online, Microsoft Network and the Internet.

In the national telecommunications network with its nearly 200 million access points, most with only basic Touch Tone or old rotary telephone input and output capability, VRU database access has been primarily limited to client proprietary customer databases indexed by telephone number. This type of access works acceptably for many applications with existing customer calls. However, for new customers, new businesses or new applications that service different target markets, these internal databases are too sparse in coverage to make VRU database lookup applications economical. On the other hand, there are national databases, such as the GDT Zip+4 Latitude and Longitude files, that do not contain a telephone number. Accordingly, these databases, and derivatives of these databases that do not contain a telephone number field, have not been utilized in VRU telephone call processing applications.

The missing link in making almost unlimited amounts of data immediately available to the VRU is creating a standardized, precise and universal database linkage key that can be assigned to all telephone numbers in the United States and U.S. territories. This key needs to act as a direct and/or translator linkage mechanism between the telephone number and spatial, geographic, and client service location databases, where the service area may be of any defined size and shape. Since the common trait shared among the above-mentioned databases is their geographic/spatial location,

definition and/or relationship, what is needed is a robust solution of a universal hierarchical geographic/spatial linkage key that is termed herein, the Spatial Key. Utilizing the Spatial Key, it becomes practical to automate many VRU applications that provide the caller with information and/or connect the caller with a servicing location.

Several applications of the spatial key linkage with a VRU would be desirable: (1) Providing the caller with the address (es) of the servicing location(s). This can be used by the caller to mail, pickup and/or drop off something to the selected servicing location. (2) Providing the caller with pre-stored micro-area directions to the service location(s). This is usually used with service locations that are very small in size, such as mail courier drop boxes or automated teller machines (ATMs) located in large physical entities, e.g., shopping centers or multi-story buildings. (3) Providing the caller with the location's open hours, drop-off times or pick-up times by use of the VRU.

SUMMARY OF THE INVENTION

The above-mentioned needs are satisfied by the present invention which includes a system and method for automatically processing telephone calls by either connecting the caller to a servicing location and/or providing the caller information regarding the servicing location.

The present invention provides a method of routing all published and unpublished telephone numbers, including unlisted numbers, secondary unpublished business lines, and public pay phones without any violation of federal, state and local laws. The present invention also provides a method for legally conforming to contracted franchise territory definitions executed between franchisers and franchisees by routing customer's calls precisely to the correct legal franchisee area. Additionally, the present invention provides a method for precisely routing telephone calls based on any geographic definition including postal geography, census geography, telecommunications geography, special grid coordinate geography, and all custom geography.

The present invention provides a method for automatically routing and processing customer calls that do not meet the pre-set client protocols. This "exceptions handling" process routes to a "live" operator who executes preset exceptions handling protocols. The present invention also provides for a method of integrating unrelated geographic information systems and database technology, telecommunications systems and database technology, postal systems and database technology, and computer technology into a common applications driven architecture. Additionally, the present invention provides a method for dynamically and instantaneously updating and integrating Client and Master Tables with no time lags. Furthermore, the present invention provides a method for automating the processing of information that is input by a customer using a customer interface that automatically routes telephone calls to customer requested destinations.

A derivative of the two table system (Master and Client tables) is a three table system. The three table system is an enhancement to the two table system. The Master Table and the Client table are used to determine the spatial service relationship of the caller provided telephone number and the servicing locations. However, in call processing where there are multiple service locations that service a caller, there is other service location dependent data that does not have any spatial attributes, e.g., hours open, days open, product inventories, that is required for selecting the best service location for the caller. This data is most efficiently stored in a third table called a Service Location table. There is one record per service location in this table which is indexed by service location identification (ID) or by service location telephone number. This table can also contain informational data, e.g., service location, name, address, general directions to a service location, a termination telephone number, a fax number and so forth, that can be spoken to the caller by a Voice Response Unit.

In one aspect of the present invention there is, in a telephone network, an automated call processing system, comprising an automated communications subsystem capable of receiving a caller-provided telephone number; means for determining a spatial key of the caller-provided telephone number; means responsive to the spatial key for retrieving client service location information corresponding to a selected servicing location, wherein the servicing location is selected if a location associated with the caller-provided telephone number spatially lies within a service area defined by the client as a geographic configuration of substantially any desired shape and size around the service location; means for communicating the servicing location and the corresponding client service location information to the caller; means for receiving and responding to the caller's service location information request; and an outbound calling module responsive to the caller's service location information request for transmitting the selected client servicing location information to the telephone network.

In another aspect of the present invention there is, in a telephone network, a method of automatically processing a telephone call, comprising the steps of: automatically generating client tables comprising a plurality of records, each record comprising a spatial key and client information indicative of a geographic location; providing a client location table for each client table, said client location table comprising a plurality of records, each record comprising a location ID and location-specific information; storing the client tables, client location tables, and a master table comprising a plurality of records, each record comprising a telephone number and a spatial key, in the telephone network; receiving a calling telephone number and a dialed telephone number from the network; indexing the master table with the received calling telephone number to obtain a master table record; retrieving a spatial key from the master table record; selecting one of the client tables from the plurality of client tables based on the dialed telephone number; indexing the selected client table with the retrieved spatial key to obtain a selected client table record; retrieving a location ID from the selected client table record; selecting one of the client location tables from the plurality of client location tables based on the dialed telephone number; indexing the selected client location table with the retrieved location ID to obtain a selected client location table record; and retrieving selected client location information from the selected client location table record.

In yet another aspect of the present invention there is an automated call processing system in a telephone network, comprising: a switch connected to the telephone network; a voice response unit (VRU) connected to the switch; a routing computer with a memory connected to the VRU by a computer network; a master file comprising a plurality of records, each record having a telephone number and a spatial key, the master file stored on the computer network; a client file comprising a plurality of records, each record having a spatial key and a client service location identification (ID), the client file being stored on the computer network, and wherein records are assigned to the client file based upon the service location ID, with respect to a geographic area of

substantially any desired shape and size; a client service locations file comprising a plurality of records, each record having a location ID and service location-specific information; means, associated with the VRU, for receiving a caller telephone number and a dialed telephone number from the telephone network; means, associated with the VRU, for selecting one of a plurality of client files and service location files, accessible by the computer network, based on the dialed telephone number; and means, associated with the VRU, for linking the master file, the client file and client service location file to produce selected client information wherein the master file is indexed by the received caller telephone number to provide a selected spatial key, wherein the client file is indexed by the selected spatial key to provide a selected location ID, and wherein the client service location file is indexed by the location ID to provide location-specific client information.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1***a* is a block diagram of the files utilized in the presently preferred Client Table build process of the present invention;

FIG. **1***b* is a block diagram of a portion of a dynamic central switch linking process of the present invention that uses the result of the table build process of FIG. **1***a*;

FIG. **1***c*, comprising FIGS. **1***d* and **1***e*, is a system level diagram of a presently preferred embodiment of the central switch linking process interconnecting a calling telephone and a destination telephone of the present invention;

FIG. **2** is a map diagram illustrating an example of a routing network for the system of FIG. **1***c*;

FIG. **3** is a top-level flow diagram of a process to build a client table using radius defined service areas for the system of FIG. **1***c*;

FIG. **4** is a map diagram illustrating an example area utilized in the description of the process shown in FIG. **3**;

FIG. **5** is a flow diagram of the zip window list function indicated at **182** in FIG. **3**;

FIG. **6** is a flow diagram of the zip windows function indicated at **262** in FIG. **5**;

FIG. **7** is a flow diagram of the initial zip list function indicated at **184** in FIG. **3**;

FIG. **8** is a flow diagram of the remove duplicates from zip list function indicated at **322** in FIG. **7**;

FIG. **9** is a flow diagram of the final zip list function indicated at **186** in FIG. **3**;

FIG. **10** is a flow diagram of the zip+4 site radius check function indicated at **188** in FIG. **3**;

FIG. **11** is a flow diagram of the service location closest to the caller function indicated at **196** in FIG. **3**;

FIG. **12***a* is a top-level flow diagram of a process to build a client table using polygon defined service areas for the system of FIG. **1**;

FIG. **12***b* is a block diagram of the files utilized in the process of FIG. **12***a*;

FIG. **13** is a diagram illustrating an example area utilized in the description of the process shown in FIG. **12***a*;

FIG. **14** is a flow diagram of the zip window list function indicated at **612** in FIG. **12***a*;

FIG. **15** is a flow diagram of the zip windows function indicated at **680** in FIG. **14**;

FIG. **16** is a flow diagram of the initial zip list function indicated at **614** in FIG. **12***a*;

FIG. **17** is a flow diagram of the remove duplicates from zip list function indicated at **752** in FIG. **16**;

FIG. **18** is a flow diagram of the final zip list function indicated at **616** in FIG. **12***a*;

FIGS. **19***a* and **19***b* are a flow diagram of the line index file function indicated at **618** in FIG. **12***a*;

FIG. **20** is a flow diagram of the zip+4 site polygon check function indicated at **620** in FIG. **12***a*;

FIG. **21** is a flow diagram of the point in polygon test function indicated at **930** in FIG. **20**;

FIG. **22** is a block diagram of a portion of a three table system embodiment of a dynamic central switch linking process;

FIG. **23** is a block diagram of a network configuration utilized at a switch for the three table system;

FIG. **24** is a flow diagram of a presently preferred embodiment of the central switch linking process for providing information to a caller and optionally interconnecting a calling telephone and a destination telephone using the tables of FIG. **22** and the network configuration of FIG. **23**; and

FIG. **25** is a flow diagram of the final call processing function indicated at **1080** in FIG. **24**.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The following detailed description of the preferred embodiments presents a description of certain specific embodiments to assist in understanding the claims. However, the present invention can be embodied in a multitude of different ways as defined and covered by the claims.

Reference is now made to the drawings wherein like numerals refer to like parts throughout.

For convenience, the discussion of the preferred embodiments will be organized into the following twelve principal sections:

I. System Overview;

II. Routing Example;

III. General Client Table Build Process;

IV. Client Table Build Process for a Radius Defined Service Area;

V. Client Table Build Process for the Service Location Closest to the Caller;

VI. Client Table Build Process for a Polygon Defined Service Area;

VII. Overview of Three Table System;

VIII. Computer-Telephone Integration Network Configuration;

IX. Three Table System Example;

X. Final Call Processing;

XI. Three Table System Table Build Process; and

XII. Summary.

I. System Overview

The present invention includes an automated telephone routing system which receives input from a common carrier, such as AT&T and AT&T American Transtech. This input includes an updated national list of telephone numbers, telecommunication infrastructure, and exception handling support.

A system and method for automatically and seamlessly routing a telephone call from a calling telephone to a

destination telephone selected by a client will be described. Optional information about the client service location can be provided to the caller if a particular client so desires. In addition, a method of creating the tables utilized by the routing system, according to criteria established by the client, will also be described.

Referring to FIG. 1*a*, the number of calculations to be performed and permutations that must be tested is reduced in creating the calling telephone number-to-service location telephone number tables used in the "1-800" routing of the present invention. Accordingly, a zip windows file **104** (FIG. 1*a*) and a process **105** to spatially access and operate on this file are a part of the present invention. It will be understood that the zip windows file **104** is just one embodiment of a spatial windows file which could include different types of spatial keys. The zip windows file **104** contains a list of all zip codes that potentially touch a tenth of a degree (0.1°) latitude and longitude spatial window. By utilizing a set of latitude and longitude extremes (minimums and maximums) for a service area in process **105**, a list of 5-digit zip codes that could overlap with the service area is generated. It is then only necessary to calculate distance or perform a point-in-polygon calculation between each service location and a small subset of zip+4 codes contained within each service area's returned list of 5-digit zip codes. File **104** and process **105** will be explained further and an example given hereinbelow.

Update problems and costs associated with continually updating and periodically rebuilding a hundred million plus record, telephone number-to-telephone number table for each business or client using the automated telephone routing system is solved by creating a dynamically linked, updatable system. Instead of creating a telephone number-to-telephone number table for each client, two tables linked by zip+4 codes, as shown in FIG. 1*b*, are created. A telephone number with its corresponding physical street address is assigned to a zip+4 code, and a Master Telephone Number to Zip+4 Table **107** (FIG. 1*b*) (the "Master Table") is built using the Postal Service's Zip+4 Address Coding Guide, and commercially available software, e.g., CODE-1® available from GROUP 1 Software, Inc. The preferred Master Table, presently maintained by AT&T American Transtech, is indexed or keyed by telephone number, and is updated on a daily basis. When phone numbers are added, changed or deleted, the table is updated. This table is also updated on a periodic basis to handle the approximate one hundred 5-digit zip code changes per quarter year, e.g., when a new zip code is created, telephone numbers in the new code area must be assigned a new zip+4 code. This represents a fairly small amount of change in relation to the 43,000 zip codes (5-digit) in the United States. At routing time, the present system allows all clients to use the same Master Telephone Number to Zip+4 Table **107**.

Independently, and on an individual client basis, each of over 28 million zip+4 codes is assigned, based on their latitude and longitude centroid coordinates, to one or more service locations using standard distance or point in polygon calculations. Hence, the present invention builds a Client Zip+4 to Service Location Telephone Number Table **106** (the "Client Table", FIGS. 1*a* and 1*b*). A different table is built for each client or for every "1-800" telephone number that a client may have. The client table build process processes one client location record at a time. The routines required to process each record are a function of the location's service area definition: radius or polygon. Once an intermediate client file is created, the disk storage requirements can be reduced by eliminating locations that are not the closest location to the caller. The building of radius and polygon client table records as well as the post-build process of creating a "closest location" client file will be described hereinbelow.

The Client Table **106** is then preferably provided to AT&T American Transtech for centralized routing at a telephone switch. This table is indexed or keyed by zip+4 code and is updated for each client as they add and delete locations, when they change telephone numbers, and on a periodic basis to handle Post Office zip code changes.

Using the presently preferred system, both the Master Table **107** and the Client Tables **106** are independently maintained by separate organizations. Using the zip+4 code as a spatial key linkage, a calling phone number in the Master Table **107** is then dynamically linked, as shown in FIG. 1*b*, to a service location phone number in the Client Table **106** and the call is automatically routed. The spatial key is a single number that identifies a specific geographically defined area, line, or point that is defined by a set of coordinates. For simple geographies like points and rectangles the spatial key can be a coded version of the coordinate description of the geography.

The postal zip+4 code is the preferred spatial key used to link the master table to the client table, but there are other small geographic areas capable of having unique spatial keys, such as zip+6 code areas, census blocks, or very small latitude/longitude grids, tiles, windows, or quad-trees. This two-table indexing approach provides a much higher automated routing rate and a higher percentage of correctly routed calls in an environment where consumers are continually moving and businesses are opening, closing, and/or moving. In addition, the two-table indexing approach also acts as a "fire wall" or buffer between regulated telephone number information and client marketing information to satisfy government regulations.

The system of the present invention directly routes the telephone call from the caller to the closest service location in approximately 40 milliseconds using the AT&T telecommunications network. The system described by Riskin intercepts the call with a private switch, answers the call with a client recorded message and asks the caller to wait, while it takes approximately 15,000 milliseconds to find the closest service location and then call forwards the call to the service location.

To route a call, the system of the present invention looks up the caller's 10-digit telephone phone number in its 100,000,000 plus record Master Table, retrieves the spatial key that identifies the location of the caller's phone, looks up the spatial key in the 28,000,000 plus record Client Table, and retrieves the telephone number of the location that services the caller's spatial key or location. The system described by Riskin looks up the caller's 6-digit exchange in its 64,000 record Exchange file having only 18,000 unique coordinates, retrieves the V-H (vertical-horizontal) coordinates of the exchange, interleaves the V-H coordinates, and starts a binary-iterative, V-H key based, size search of the N record client service location database. The Riskin system iterates through this process, adjusting the size of the geographic areas searched, until it retrieves a number of service locations that fall within a predetermined range. Riskin then calculates the distance to each service location. If more than one location fits the criteria to be considered the closest distance, one location is randomly selected as the closest service location.

II. Routing Example

Prior to discussing the building of Client Tables in more detail, it will be helpful to first discuss use of this table and

the Master Table in a "1-800" routing example. Referring to a central switch process **108** shown in FIG. **1***c* and a routing network shown in FIG. **2**, an example of telephone call routing will now be given. In this example, a caller dials 1-800-Italian to order a "MyPizza" pizza from his phone (619-755-5666) located at 498 Stevens Avenue in Solana Beach, Calif. 92075-2064. Of course, the present invention is not limited to use of "800" telephone numbers as other numbers may be used in other embodiments.

FIG. **1***c* includes process states and also data at **114**, **132**, and **146**, indicated by parallelogram blocks. Also, the central switch process is handled inside a switch as will be described below.

The steps involved in having this call automatically routed to the caller's local MyPizza Restaurant are as follows:

1. A caller at "Location A" **160** (FIG. **2**), dials 1-800-Italian at block **110** (FIG. **1***c*) to order, for example, a pizza.

2. Based on the 1-800 dialed and the caller's long distance carrier, the call is routed by various telephone companies to an intelligent central switch in Jacksonville, Fla., indicated on FIG. **2** by "Location B" **162**. The process associated with the switch is shown in FIG. **1***c* as being below the dotted line just before state **112** and above the dotted line just after state **148**. The central switch **111** is preferably a "4 ESST™" digital switch available from AT&T. The switch includes a general purpose computer (not shown) such as a network control point computer with a memory.

3. Once the Jacksonville switch has the call, it pulls the caller's telephone number from the calling information packet **114**, by call decoding hardware **112** which performs Automatic Number Identification (ANI). The preferred information packet **114** corresponds to the operation parameter field of the SS7 TCAP message available at the switch **111**. The hardware to perform ANI is described in U.S. Pat. No. 5,163,087 to Kaplan, and is hereby incorporated by reference. The number equivalent of 1-800-Italian is 1-800-482-5426, and the information packet looks as follows:

> Packet: . . . 6197555666 . . . 18004825426 . . . The "1-800" number is an IN-WATS (inbound wide area telephone service) number and must be translated by a wide area carrier to a POTS (plain old telephone service) number to be routed to the switch **111**. Upon receiving the POTS number, the switch **111** translates the number back to the WATS format.

4. Then, at decision state **116**, the process **108** determines whether the client has chosen to give the caller an option to enter a telephone number on a Touch Tone telephone keypad or other means. In other embodiments, other characters are entered, such as a credit card number, an account number, or product order information, to enable other features of the system. In the presently preferred embodiment, the telephone number represents the location where the caller desires, for example, a product to be delivered or a service to be performed. As an example, if a client had a telephone number such as 800-FLORIST and desires the optional input feature, the caller could choose to have the flowers delivered to the address corresponding to a caller entered telephone number. If the decision state **116** is determined to be true, the process **108** moves to state **118** to capture the telephone number entered by the caller. This number is then used in place of the calling number in the information packet for further handling. However, if the decision state **116** is determined to be false, the original calling number is unchanged, and the process **108** moves to a decision state **120**.

5. At decision state **120**, the process **108** determines if the calling number in the information packet is that of a mobile telephone. A file in the computer of the switch **111** listing mobile telephone numbers is presently maintained by AT&T American Transtech and is updated on an as-needed basis. Mobile telephones are assigned a number from a set of prefixes unique to each area code in the U.S. Therefore the mobile telephone number file only needs to contain the area code and prefix combination (6 digits) to identify that the calling number is that of a mobile telephone. Because the mobile telephone user, as determined at decision state **120**, is not associated with a fixed location, the process **108** moves to a state **128** for handling non-routable exceptions. An operator will then request location information from the mobile telephone caller. Additional information about state **128** will be provided below. If the caller is not using a mobile telephone, the process **108** continues from state **120** to state **122**.

6. At state **122**, the process **108** looks up the caller's telephone number preferably using, the well-known Indexed Sequential Access Method (ISAM) to index the Master Telephone Number to Zip+4 Table **107** (FIG. **1***b*). ISAM is a well known method of searching described in the book *Operating System Concepts* by Peterson and Silberschatz. Other searching techniques may be used in other embodiments. The Master Table **107** was described in the System Overview section. As an example, a segment of a Master Table **107** is shown in Table 1. This table is indexed by phone number and also contains the zip+4 code **132** of the physical address where the calling phone is physically located.

TABLE 1

Example: Master Telephone Number to Zip + 4 Table segment

	Phone #	Zip + 4
	.	.
	.	.
	6197555664	920751311
	6197555665	920141313
>	6197555666	920752064
	6197555668	920071234
	.	.

7. A test is performed at a decision state **126** to determine if the calling number is listed in the Master Table **107**. If not, the process **108** moves to state **128** wherein operator assistance is provided to route the call. The non-routable exception handling at state **128** is for situations wherein a Master Table **107** or Client Table (FIG. **1***a*) entry is missing, incorrect, or the caller is using a mobile telephone. In the presently preferred embodiment, operator assistance is provided by AT&T American Transtech. In general, only a small percentage of the calling numbers are not listed in the Master Table **107**. If the calling number is listed in the Master Table **107**, the process **108** advances to a decision state **130** to determine if there is a zip+4 code **132** corresponding to the calling number in the packet **114**. If not, the process **108** moves to state **128** wherein operator assistance is provided to route the call as mentioned previously. If a zip+4 code **132** is located in the Master Table **107**, the process **108** moves on to state **134**.

8. Since the information packet **114** also contains the number dialed, at state **134** the process **108** opens the Client Zip+4 to Service Location Table A **106***a* that is associated with the client having the telephone number 800-482-5426. The Client Table **106** is selected from a plurality of Client

Tables based on the telephone number dialed by the caller. Client Table B **106***b* and additional tables, as necessary, are for other clients or other phone numbers, e.g., another "800" number, of the same client. The Client Tables are built by the assignee of the present invention, the client, or a third party to the assignee's specifications. There are two types of Client Tables. If calls are to be routed to the closest location or to a service location servicing a non-overlapping polygon trade area, the first type of Client Table contains only a single entry per zip+4 code with its corresponding service phone number **146** and distance. In cases where the client wants a random or weighted selection, from multiple selections, whose service areas service the caller or provide the caller a choice, the second type of Client Table can have multiple records per zip+4 code, with each record having a different service telephone number and distance. The process **108** looks up the caller's zip+4 code in the MyPizza Client Table **106***a* using the Indexed Sequential Access Method.

9. A test is performed at a decision state **140** to determine if the zip+4 code **132** is listed in the Client Table **106***a*. If not, the process **108** moves to state **128** wherein operator assistance is provided to route the call. If the zip+4 code is in the Client Table **106***a*, the process **108** proceeds to a decision state **142** to determine whether there is a client telephone listing for the zip+4 code **132**. If not, the process **108** moves to state **144** wherein operator assistance is provided to route the call, provide information, or take other action as determined by the client. A negative test result determined at state **142**, may arise, for example, if there is no service location within a client specified radius of the calling party. The exception handling at state **144** is for situations where the call is correctly routed, but the calling party does not get what is expected, i.e., the call is not satisfactorily completed (as in states **142**, **152**, and **154**). In these situations, the client may select from a set of alternatives that can be handled by an automated process. An example exception handling message is as follows: "We are sorry, but there is currently no service location within your area. If you desire to talk to a representative, please press zero."

If there is a client telephone number associated with the zip+4 code **132**, the process **108** advances to state **148**. As an example, a segment of Client Table **106***a* is shown in Table 2.

TABLE 2

Example: 800-482-5426 Client Table segment

ZIP - 4	Phone #	Distance in miles
920752060	6199423366	3.1455
920752062	6199423366	2.1682
920752064	6194817777	1.2854
920752065	6197591111	0.1234

10. After finding the caller's zip+4 code **132** and the corresponding service telephone number **146**, the switch, at state **148**, sends the information packet over the telephone network to ring at the telephone associated with the number 619-481-7777.

11. At block **150**, the telephone at MyPizza located at 2688 Via De La Valle in Del Mar, Calif. 92014-1909, "Location C" **164** (FIG. 2), rings.

12. If the telephone at the client service location is "busy" **152** or there is "no answer" **154**, the process **108** proceeds to the exception handling state **144** as described previously. At the client's request, the exception handling at state **144** may, for instance, route the call to the next closest service location. Otherwise, if the "busy" or "no answer" conditions are false, the telephone call is answered and the caller may, for example, order a pizza.

III. General Client Table Build Process

The process **105** (FIG. 1*a*) of creating or building a Client Table **106** for each client or each "800", or similar number, for the client will now be described. This process is preferably performed on a general purpose computer, such as an AT&T 3600 UNIX box. As previously mentioned, the present invention includes two types of service area definitions: radius and polygon. How these two definitions are incorporated into the client table build process will be discussed below. In addition, the post-build process of eliminating more distant records from the client table to create a client table containing only the closest service location to a caller will also be discussed. This is used to reduce disk storage in applications where there is no means for providing the caller a choice and only one service location telephone number can be passed to the telecommunications network. An example of the process steps will be given using a fictitious food service business.

The process for each type of service area definition utilizes four input files as shown in FIG. **1***a*. The zip+4 centroid file and zip windows file were briefly discussed in the System Overview section. Each input file is now further described. The following discussion again refers to FIG. 1*a*.

A. Client Service Locations File

The first file is a client service locations file **109** containing a list of service locations provided by the client. The service locations and their service areas are defined by either a latitude/longitude location and a radius or a latitude/longitude location and a latitude/longitude polygon. Further detail about file **109** is provided in conjunction with state **174** of FIG. **3** (radius) and state **604** of FIG. **12***a* (polygon).

B. Zip+4_Lat_Lon Centroid File

The second file is the zip+4 latitude and longitude centroid file **100** or zip+4_lat_lon centroid file previously described. This file is available from the U.S. Postal Service or from, for example, Geographic Data Technology, Inc. (GDT).

C. Zip Array File

The third file is a zip array file **103** created from the zip+4 latitude and longitude centroid file **100** and provides three benefits that improve processing efficiency.

The first benefit is building an array where the row number of the array is equal to a 5-digit zip code. This provides a very efficient method of indexing to a 5-digit zip code where the 5-digit zip code number is the row number of the array.

The second benefit is once the 5-digit zip code is accessed in the array, the exact byte offset of where the first zip+4 code for this 5-digit zip code starts in the zip+4 latitude and longitude centroid file **100** is known. Using this method, it is very efficient to advance to the location of the first zip+4 record and read all the zip+4 records for a 5-digit zip code in the over 28 million record zip+4 latitude and longitude centroid file **100**.

The third benefit of the zip array file **103** is that for each five digit zip code, the file contains the latitude and longitude minimums and maximums for all the zip+4 codes in the 5-digit zip code. By checking to see if a radius or a polygon service area set of extremes overlap with the 5-digit zip code extremes, testing each zip+4 in a 5-digit zip code is

eliminated, if it is determined beforehand that there is no spatial overlap between the zip+4 extremes in a 5-digit zip code and the radius or polygon service area.

The zip array file **103** is created using the GDT or Post Office supplied zip+4 latitude and longitude zip+4 centroid file **100**. Each record in the centroid file **100** contains a zip+4 number, and the latitude and longitude defined centroid for each zip+4. A four step, zip array file build process **101**, as follows, is used to create the zip array file **103**:

1.) A 32-bit integer array of 99,999 rows and 6 columns is initialized to zero. Column one is initialized to the row number which is then utilized as the 5-digit zip code.

2.) For a 5-digit zip code, every zip+4 record in the zip+4 latitude and longitude centroid file **100** is read in a sequential manner. The byte offset for the first zip+4 within the 5-digit zip code is noted. Temporary variables are initialized and then used to determine the latitude and longitude minimums and maximums of the zip+4 centroids for the current 5-digit zip code. The greatest and least of both the latitudes and longitudes among all zip+4 codes for the current 5-digit zip code are then passed on to the next step.

3.) With each change in 5-digit zip code, the byte offset for the first zip+4 within a 5-digit zip code and the latitude and longitude minimums and maximums for all zip+4 codes within a five digit zip code are written to memory for the previous 5-digit zip code to its location in the zip array file **103**. The latitude and longitude minimum and maximum values are then reinitialized, and the previous and current steps are repeated with the next 5-digit zip code until the end of the zip+4 centroid file **100** is reached.

4.) Upon reaching the end of the zip+4 centroid file **100**, the last 5-digit zip code record is written to memory, and then the zip array file stored in memory is written to a mass storage device such as a magnetic disk.

The column definitions for each row of the zip array file **103** are as follows:

column (1) is the 5-digit zip code number;

column (2) is the byte_offset into the zip+4 _lat_lon centroid file **100** of the location of the lowest numbered zip+4 for the 5-digit zip code of that row;

column (3) is a minimum latitude for the zip code of that row (zip_lat_min);

column (4) is a maximum latitude (zip_lat_max);

column (5) is a minimum longitude (zip_lon_min); and

column (6) is a maximum longitude (zip_lon_max).

D. Zip Windows File

The fourth file is the zip_windows file **104**. The purpose of this file is to build a linkage between a latitude and longitude defined area on the earth and the zip codes that could theoretically touch this area. This linkage provides benefit by making spatial computer searches of postal geography much faster and much more efficient.

The zip_windows file **104** is created from the GDT or Post Office zip+4 latitude and longitude centroid file **100** using latitude and longitude, digitized polygon zip code boundaries. The general concept is to divide the earth into one tenth of one degree (0.10) latitude and longitude rectangles, which, for example, are approximately 6.9 miles by 5.2 miles in dimension at 40° latitude, and then tabulate all zip codes that overlap each rectangle.

The zip_windows file **104** is created by a zip windows file build process **102** that reads each record from the over 28 million record zip+4 centroid file **100** and writes a corresponding record that contains a latitude and longitude (lat/lon) window and a 5-digit zip code. The lat/lon window field is created by multiplying the latitude in degrees times 10, taking the integer portion (INT) of the product, multiplying the integer portion by 10,000, and then adding the integer portion of the product of the longitude in degrees times 10.

For example, if the input zip+4 record is 920141909, the latitude is 32.9862 North and the longitude is 117.2522 West, the output zip_window record would be 3291172 for the lat/lon window and a zip code of 92014. After all records have been written to an initial or temporary zip_windows file (not shown), the file is then sorted by the lat/lon window value or key with the corresponding 5-digit zip code, and duplicate records are eliminated. The resultant final zip_windows file **104** is then written with each record composed of the lat/lon window key and the corresponding 5-digit zip code. Four lat/lon windows **210**, **212**, **214**, **216**, corresponding respectively to zip window keys 3301172, 3301171, 3291172, 3291171, are illustrated in FIG. **4**.

Now that the input files utilized by the Client Table build process have been described, each of the three different service area definition build processes will be described.

IV. Client Table Build Process for a Radius Defined Service Area

Referring generally to FIGS. **3** and **4**, a Client Table Process **170** for a radius defined service area will be described. Process **170** is a specific version of the client table build process **105** shown in FIG. **1***a*.

The process **170** begins at a start state **172** and moves to state **174** wherein a client provides a client service locations file **109** (FIG. **1***a*) of service locations in machine readable form with information and format as shown in Table 3. The file **109** can be created by, for example, a commonly available word processing program or a database program, and submitted on a floppy disk or other suitable media. Table 3 includes example information for a service location **218** named MyPizza Ristorante. The map of FIG. **4** illustrates some of the same information including a circle **220** to show a 2.5 mile radius from the MyPizza Ristorante as the service area.

TABLE 3

Record layout in ASCII Characters

Name of Service Location (30) Bytes	MyPizza Ristorante
Address (36) Bytes	2688 Via De La Valle
City (30) Bytes	Del Mar
State (2) Bytes	CA
Zip Code (9) Bytes	92014
Telephone # (10) Bytes	6194817777
Radius in tenths of miles (4) Bytes	25

Of course, other forms, information, and formats may be substituted in other embodiments.

The process **170** moves to state **176** wherein the list of service locations in file **109** is address standardized, zip+4 coded, and latitude and longitude geocoded using commercially available services through companies such as Group I and Geographic Data Technology. Table 4 is an example of a standardized record with latitude and longitude appended.

TABLE 4

Name of Service Location (30) Bytes	MYPIZZA RISTORANTE
Address (36) Bytes	2688 VIA DE LA VALLE
City (30) Bytes	DEL MAR
State (2) Bytes	CA
Zip Code (9 Bytes	920141909

TABLE 4-continued

Telephone # (10) Bytes	6194817777
Radius in tenths of miles (4) Bytes	25
Latitude in degrees (10) Bytes	32.9862
Longitude in degrees (12) Bytes	-117.2522

Moving to state **178**, the process **170** establishes the constant of 68.9404 miles per degree latitude and reads the zip array file **103** (FIG. 1*a*) into memory of the computer. At state **180**, the process **170** reads a record from the file of service location records and calculates the number of miles per degree longitude for the service location. The miles per degree longitude=68.9404*COSINE (latitude). For the example given in Table 4, at 32.9862 degrees latitude, the result is 57.8297 miles per degree longitude.

The process **170** proceeds to a function **182** which creates a list of zip windows that the service location touches. Touching a zip window means that at least part of the service area is in or overlaps the zip window. The zip windows **210**, **212**, **214**, **216** for the example given in Table 4 are illustrated in FIG. **4**. The function **182** will be further described in conjunction with FIG. **5** hereinbelow.

Moving to a function **184**, the process **170** generates a list of 5-digit zip codes that touch any of the zip windows identified by function **182**. This zip list is sorted in ascending order and duplicate zip codes are removed in the function **184**. The function **184** will be further described in conjunction with FIG. **7** hereinbelow.

The process **170** proceeds to a function **186** wherein 5-digit zip codes that are not within the service location site radius specified in state **174** are removed from the zip list generated by function **184**, and a zip final list is created. The function **186** will be further described in conjunction with FIG. **9** hereinbelow.

Advancing to function **188**, the process **170** retrieves all the zip+4 records corresponding to the zip codes in the zip final list (generated by function **186**), used in conjunction with a zip pointer list (also generated by function **186**), and determines if the zip+4 is at or inside the service area radius. This determination also yields the distance from the service location to the zip+4 centroid (recalling that the zip+4 centroids are stored in the zip+4 centroid file **100**). If the zip+4 is determined to be at or inside the service area radius, a raw Client Table record is written that includes the zip+4 code, the client telephone number for the instant service location, and the distance of the zip+4 centroid to the service location. The function **188** will be further described in conjunction with FIG. **10** hereinbelow.

The process **170** moves to a decision state **190** to determine if additional client service records are to be processed. If so, the loop of states **180** to **188** is repeated for the next service location record. If all service location records have been processed for the instant Client Table, the process **170** advances to state **192**. At state **192**, the process **170** sorts the raw records, written by function **188**, by ascending zip+4 code and then by descending distance if the same zip+4 code is listed more than once. The same zip+4 code could be listed more than once if there are multiple service locations, each with a different client telephone number, within the client specified service area.

Moving to a decision state **194**, a determination is made if the client has selected the post-build option of generating the client table for the service locations closest to the caller. If not, the client table build process is complete except for loading the file to the production system computer at state **198**. However, if the client has selected the post-build option of "closest service location", as determined at decision state **194**, the process **170** moves to a function **196** to finish the Client Table build process. The function **196** will be further described in conjunction with FIG. **11** hereinbelow.

If the client has not selected the "closest location" option at decision state **194**, the process **170** moves to a state **198** wherein the sorted Client Table from state **192** is loaded into the computer in the telephone network switch **111** (FIG. **1***c*), and an index key on the zip+4 codes is built. Upon completion of either function **196** or state **198**, the Client Table build process ends at state **200**.

Referring generally to FIG. **5**, the function **182** defined in FIG. **3** will be described. Function **182** generates a list of zip windows that the site touches by first calculating site latitude and longitude extremes. For this calculation, the absolute value is used for both the latitude and longitude.

In another embodiment of the present invention, a prefix is assigned to the window key based on the sign of the latitude or longitude. The United States is located in the North-west quadrant, and the key for this quadrant is zero(0). A leading zero has no impact on the value of the numeric key. The other quadrants are Northeast, east of the prime meridian at Greenwich, England in the Northern hemisphere; Southwest, west of the prime meridian in the Southern hemisphere; and Southeast, east of the prime meridian in the Southern hemisphere.

Since almost all countries of the world are only in one quadrant, using the absolute value of the latitude and longitude works well. In the few countries that are exceptions (that are in two quadrants), a different coordinate system may be used, e.g., the Ordinance Survey system used in the United Kingdom.

Beginning at a start state **252** shown in FIG. **5**, the process **170** moves to a state **254** to calculate latitude extremes of the service area. Several abbreviations will be used hereinforward: "min" for minimum, "max" for maximum, "lat" for latitude, and "lon" for longitude.

Site_lat_min=site_lat-radius(miles)/miles per degree lat;

Site_lat_max=site_lat+radius(miles)/miles per degree lat.

Computation for the example service location and radius given in Table 4 yields:

Site_lat_min=32.9862-2.5/68.9404=32.9499;

Site_lat_max=32.9862+2.5/68.9404=33.0228.

The process continues at state **256** wherein longitude extremes of the service area are calculated.

Site_lon_min=site_lon-radius (miles)/miles per degree lon;

Site_lon_max=site_lon+radius (miles)/miles per degree lon

Computation for the example service location and radius given in Table 4 yields:

Site_lon_min=117.2522-2.5/57.8297=117.2089;

Site_lon_max=117.2522+2.5/57.8297=117.2954.

Moving to states **258** and **260**, the process **170** builds values for zip window minimum and maximum based on the site latitude and longitude, respectively. Computation using the above example and results yields:

Site_lat_window_min=Int(10*site_lat_min)=329;

Site_lat_window_max=Int(10*site_lat_max)=330;

Site_lon_window_min=Int(10*site_lon_min)=1172;

Site_lon_window_min=Int(10*site_lon_max)=1172.

Moving to a function **262**, the process **170** generates zip windows based on latitude min and max values, and longitude min and max values and stores them in a zip_windows_list, which is distinct from the zip_windows file **104** (FIG. **1***a*). Function **262** will be further described below in conjunction with FIG. **6**. The function **182** returns at state **264** to FIG. **3**.

Referring to FIG. **6**, the function **262** defined in FIG. **5** will be described. Function **262** builds the actual zip_window list_for the service location. The function begins at a start state **270** and moves to state **272** wherein the variable I is set to equal zero (0), and the variable J is set to equal the value for the site latitude window minimum. After the initialization of state **272**, the process **170** moves to state **274** wherein the variable K is set equal to the value for the site longitude window minimum. Moving to state **276**, the value of variable I is incremented by one.

At state **278**, a value of the zip_window_list, identified or addressed by the value of variable I, is calculated as the value of the variable J multiplied by 10000 and then adding the value of variable K. State **280** determines whether the value of K has reached the maximum value, and if not, the value of K is incremented by one (1) at state **282**, and a loop to state **276** is performed. If K has reached the maximum site longitude value, the process **170** continues at state **284** to determine whether the value of J has reached the maximum value, and if not, the value of J is incremented by one (1) at state **286**, and a loop to state **274** is performed. If J has reached the maximum site latitude value, the function **262** returns at state **288** to FIG. **5**.

Continuing the example given in conjunction with FIG. **5**, the result of function **262** is as follows:

Zip_window_list(1)=3291172

Zip_window_list(2)=3301172

Referring to FIG. **7**, the function **184** defined in FIG. **3** will be described. Function **184** generates a list of 5-digit zip codes touching the zip windows identified by function **182** (FIG. **5**). Beginning at a start state **300**, the process **170** moves to a state **302** and retrieves the zip_windows file **104** (FIG. **1***a*) previously described and the zip_window_list from function **182**. The zip_windows file **104** is indexed by the zip_window key and contains a list of all zip codes that touch the zip window. A sample of the zip_windows file **104** is given in Table 5, which corresponds with FIG. **4**.

TABLE 5

Window	Zip_code
3291172	92014
3291172	92075
3291172	92130
3301172	92007
3301172	92014
3301172	92024
3301172	92029
3301172	92075

Continuing at state **304**, the process **170** initializes the variable K to the value of zero (0) and the variable J to the value of one (1). Then at state **306**, the process **170** advances to the record in the zip_windows file **104** having the key equivalent to the value of the zip_window_list addressed by the variable J. At state **308**, the record accessed at state **306** is read to get the zip_window and the associated zip code. Moving to state **310**, the variable K is incremented by one (1), followed by state **312** wherein zip code read at state **308** is written to a zip_list addressed by the variable K. A check is then made at a decision state **314** to determine if the value of the zip_window from state **308** is greater than the value of the zip_window_list addressed by the variable J. If not, the next record in the zip_windows file **104** is read by looping back to state **308**.

If the decision state **314** test is true, the process moves to a decision state **316** to determine if the value of J is equivalent to the number of windows in the zip_window_list. If not, the value of J is incremented by one (1) and a loop back to state **306** is performed to process the next window. If the decision state **316** is true, all windows in the zip_window_list have been processed, and the function **184** continues at state **320** wherein the zip_list of 5-digit zip codes is sorted in ascending order. For the continuing example, after state **320**, the zip_list appears as follows:

92007
92014
92014
92024
92029
92075
92075
92130

Moving to a function **322**, the process **170** removes duplicate entries in the zip_list to generate a deduped_zip_list. Function **322** will be further described in conjunction with FIG. **8** below. The function **184** returns at state **324** to FIG. **3**.

Referring to FIG. **8**, the function **322** defined in FIG. **7** will be described. Function **322** removes duplicate 5-digit zip codes from the zip_list as sorted in state **320** of FIG. **7**. Beginning at a start state **340**, the process **170** moves to a state **342**, and the first entry of zip_list is defined to be the first entry of a deduped_zip_list. Proceeding to state **344**, a variable L is assigned the value of one (1) and a variable J is assigned the value of two (2). Then at a decision state **346**, the process **170** determines whether the value of zip_list addressed by J is equivalent to the value of zip_list addressed by "J minus one". If not, variable L is incremented by one at state **348**, and the next entry in deduped_zip_list as addressed by L is written to be equivalent to the entry in the zip_list as addressed by J.

If the decision state **346** is false or at the completion of state **350**, the process **170** moves to a decision state **352** to determine if the value of variable J is equal to the number of zip codes in the zip_list. If not, variable J is incremented by one at state **354**, and the process **170** loops back to state **346** to check the next entry in zip_list. However, if all zip codes in zip_list are checked, as determined by state **352**, the function **322** returns at state **356** to FIG. **7**. For the continuing example, the deduped_zip_list at the completion of function **322** is as follows:

92007
92014
92024
92029
92075
92130

Referring to FIG. **9**, the function **186** defined in FIG. **3** will be described. Function **186** builds a zip_final list and a

zip_pointer list by checking zip boundary extremes and getting an offset to the start of the zip+4_lat_lon centroid file **100** (FIG. 1*a*) from the zip array file **103**. This procedure eliminates zip codes that do not touch the area covered by the radius of the service area. Beginning at a start state **370**, the process **170** moves to a state **372** and accesses the zip array file **103** (FIG. 1*a*). Function **186** utilizes all columns, as previously described, of the zip array file **103** (FIG. 1*a*). Moving to state **374**, variable I is set to a value of zero, and variable J is set to a value of one. Proceeding to state **376**, variable M is set equivalent to the entry in deduped_zip_list, from function **184**, addressed by J.

Using the site information calculated in Function **182** and the information from the zip array table, a series of checks are performed by decision states **378** to **384**. At decision state **378**, the process **170** determines whether the site_lat_max is less than the zip_lat_min for the zip array file entry addressed by the variable M. If so, the process **170** moves to a decision state **386**. If not, the process continues at decision state **380**. At decision state **380**, the process **170** determines whether the site_lat_min is greater than the zip_lat_max for the zip array file entry addressed by the variable M. If so, the process **170** moves to decision state **386**. If not, the process continues at decision state **382**.

At decision state **382**, the process **170** determines whether the site_lon_max is less than the zip_lon_min for the zip array file entry addressed by the variable M. If so, the process **170** moves to decision state **386**. If not, the process continues at decision state **384**. At decision state **384**, the process **170** determines whether the site_lon_min is greater than the zip_lon_max for the zip array file entry addressed by the variable M. If so, the process **170** moves to decision state **386**. If not, the process continues at state **392**. To get to state **392**, a determination has been made that the zip code does touch the area covered by the radius of the site. At state **392**, variable I is incremented by one, and at state **394**, the process **170** writes the value of M to the zip_final list entry addressed by I. Moving to state **396**, the process **170** writes the value of byte_offset from the zip array file entry addressed by the variable M to the zip_pointer list entry addressed by **I**, and the process moves to state **386**.

If any of the decision states **378** to **384** is true, the current zip code entry from deduped_zip_list is not further used. At decision state **386**, a determination is made whether all entries in the deduped_zip_list have been checked. If not, J is incremented by one at state **388**, and the process **170** loops back to state **376** to check the next entry. If all entries have been checked as determined by state **386**, the function **186** returns at state **398** to FIG. 3. For the continuing example, the zip_final list at the completion of function **186** is as follows:

92007
92014
92075
92130

Referring to FIG. **10**, the function **188** defined in FIG. 3 will be described. Function **188** reads all zip+4 records as identified by the combination of the zip_final list and zip_pointer list, and determines if the zip+4 centroids are inside the site radius. Beginning at a start state **420**, the process **170** moves to a state **422** and gets the zip_final list, the zip_pointer list, and the zip+4 centroid file **100**. At state **424**, variable J is set to a value of one. Moving to state **426**, the process **170** advances in the zip+4 centroid file to the address contained in the zip_pointer list addressed by the variable J. Then, at state **428**, the zip+4 latitude/longitude record is read at the address from state **426**. The zip+4 centroid file **100** (FIG. 1*a*) is sorted in ascending zip+4 order, and each record in this file contains three fields: zip+4 code, latitude in degrees, and longitude in degrees. Moving to state **430**, the process **170** calculates the distance from the service location to the zip+4 centroid. The site latitude and longitude are available from state **176** while the zip+4 latitude and longitude are available from state **428**. Moving to state **432**, the process **170** determines if the distance squared from state **430** is greater than the radius squared (which is available from state **174**). If not, the zip+4 code is inside the site radius, and the process **170** moves to state **434** to write a raw client table zip+4 telephone number record. This record contains the zip+4 code, the telephone number of the client service location, and the square root of the distance squared.

If the distance squared is greater than the radius squared, the zip+4 code is outside the site radius, and the process moves to a decision state **436**. At state **436**, the process **170** determines if the current zip+4 code is greater than 10000 times the value of the zip_final list entry addressed by the variable J plus 9999. The current zip+4 is compared to a value for the highest possible numbered zip+4 for the current zip code by appending 9999 to the 5-digit zip code. For example, if the zip code is 92007, the highest possible number for a zip+4 for this zip code is 920079999. While reading the zip+4 records for zip code 92007, if the zip+4 record read is greater than 920079999, then the end of zip+4 records for the 92007 zip code is passed, and the process **170** moves to the next zip code in the zip_final list. If the decision state **436** is false, the process **170** moves to state **438** and advances to the next zip+4 record for the same 5-digit zip code in the zip+4 centroid file **100**. The next record is read by looping back to state **428**.

If decision state **436** is true, the process **170** moves to a decision state **440** to determine if all records in the zip_final list have been read. If not, the variable J is incremented by one at state **442**, and the process loops back to state **426** and repeats the procedure for the next 5-digit zip code in the zip_final list. If all 5-digit zip codes have been processed as determined by state **440**, the function **188** returns at state **444** to FIG. 3. For the continuing example, a sample record of the raw Client table at the completion of state **434** is as follows:

Sample record: *r*

Sample record:	920752064	61948C7777	1.2865.

V. Client Table Build Process for the Service Location Closest to the Caller

The "closest" process, function **196** (FIG. 3), is a post-build process for building a Client Table **106** created from radius defined service areas, polygon defined service areas or a mix of both types of service areas. The primary functions of the "closest" process are to reduce disk storage and clean up polygon digitizing errors that create minor overlaps in non-overlapping service areas. States **172** to **194** (FIG. 3) in the radius process or states **602** to **624** (FIG. 12*a*) in a polygon process must be completed to create an intermediate client table that can be reduced in size and or cleaned up by the post-build process **196**.

Referring to FIG. **11**, function **196** as defined in FIG. 3 will be described. Function **196** removes multiple assignments of a zip+4 code and keeps the one with the shortest distance. Beginning at a start state **500**, function **196** accesses the sorted intermediate Client Table (not shown)

which is available at the completion of state **192**. Moving to state **504**, a variable "last_zip+4" is set equal to the value of zero. Then, at state **506**, beginning with the first record, a record is read from the intermediate Client Table. Moving to a decision state **508**, a determination is made whether the zip+4 just read in the record from state **506** is equivalent to the value of last_zip+4. If not, the current record is written to the Client Table **106** at state **510**, followed by setting the variable last_zip+4 equivalent to the current zip+4 code at state **512**.

At the completion of state **512**, a decision state **514** determines if the end of the sorted intermediate Client Table has been reached. If not, the function **196** advances to the next zip+4 code in the intermediate Client Table and loops back to state **506** to process the next record. If the end of the intermediate Client Table has been reached as determined by state **514**, the Client Table **106** is loaded in the computer of the telephone switch **111** and an index key on the zip+4 code is built. Function **196** returns at state **520** to state **200** of FIG. **3** to end the "closest" process.

VI. Client Table Build Process for a Polygon Defined Service Area

In general, there are two types of polygon defined service areas. The first type is an exclusive or non-overlapping trade area, and the second type is a non-exclusive or overlapping trade area.

For a non-overlapping polygon defined service area, each franchisee has a defined trade area, such as the area in which they deliver a product. The following situation is given to illustrate this concept. A customer could be located closer to, say, Franchisee B than Franchisee A, but if the customer is in the polygon area for Franchisee A, only the telephone number for Franchisee A will be in the Client Table **106** (FIG. **1***a*) record corresponding to the location of the customer. However, if the service areas for Franchisee A and Franchisee B are overlapping, the Client Table **106** would have one record with the telephone number and distance for Franchisee A, and another record with the telephone number and distance for Franchisee B. Therefore, the client table build process **105** accommodates both types of polygon defined service areas.

Referring generally to FIGS. **12***a*, **12***b*, and **13**, a Client Table process **600** for a polygon defined service area will be described. Process **600** is another specific version of the general process **105** shown in FIG. **1***a*. Many parts of the polygon defined service area process **600** (also referred to as the polygon process) are identical with those of the radius defined service area process **170**. Some functions have minor changes. Other functions are totally different. For functions that are almost identical only the differences will be identified and explained to avoid repetition. The new functions will be described in some detail.

The process **600** begins at a start state **602** and moves to state **604** wherein a client provides a client service locations file **109** (FIG. **1***a*) of service locations in machine readable form with information and format as previously shown in Table 3. The client also provides a detailed street map with the polygon service area of the service location drawn on the street map with the telephone number of the service location written inside the polygon service area. The map of FIG. **13** illustrates an example polygon service area **640**.

The process **600** moves to state **606** wherein the list of service locations in file **109** is address standardized, zip+4 coded, and latitude and longitude geocoded using commercially available services through companies such as Group 1 and Geographic Data Technology. Table 4 is the example of a standardized record with latitude and longitude appended. In addition, the latitude and longitude vertices for the polygon service area drawn on the street map are digitized using a commercially available GIS system such as Infomark for Windows available from Equifax National Decision Systems. The digitizing process of state **606** assigns latitude and longitude coordinates for the vertices of the polygon and creates a polygon file **607** as shown in FIG. **12***b*. An example of the polygon file **607** is shown in Table 6 with the following data items :

TABLE 6

Geocode:	6194817777
Name:	MyPizza Del Mar
Number of vertices:	5
Lat/Lon vertex pairs:	33.0370 -117.2910
	32.9503 -117.2874
	32.9623 -117.2132
	33.0187 -117.2084
	33.0370 -117.2910

The last latitude/longitude vertex pair must equal the first pair to close the polygon. This example is for a very simple polygon. Typical franchise polygons are very complex; the polygon may follow non-linear street boundaries and contain hundreds of vertices. The geocode is the telephone number of the service location. The polygon file data is appended to the end of its corresponding record of the client service locations file **109**, creating a variable length record.

Moving to state **608**, the process **600** establishes the constant of 68.9404 miles per degree latitude and reads the zip array file **103** (FIG. **1***a*) into memory of the computer. At state **610**, the process **600** reads a record from the client service location file **109** and calculates the number of miles per degree longitude for the service location. The miles per degree longitude=68.9404*COSINE (latitude). For the example given in Table 4, at 32.9862 degrees latitude the result is 57.8297 miles per degree longitude.

The process **600** proceeds to a function **612** which generates a list of zip windows that the service location touches. Touching a zip window means that at least part of the service area is in or overlaps the zip window. The zip windows for the example given in Table 4 are illustrated in FIG. **13**. The function **612** will be further described in conjunction with FIG. **14** hereinbelow.

Moving to a function **614**, the process **600** generates a list of 5-digit zip codes that touch any of the zip windows identified by function **612**. This zip list is sorted in ascending order and duplicate zip codes are removed in function **614**. The function **614** will be further described in conjunction with FIG. **16** hereinbelow.

The process **600** proceeds to a function **616** wherein 5-digit zip codes that are not within the polygon service area specified in state **604** are removed from the zip list generated by function **614**, and a zip final list is created. The function **616** will be further described in conjunction with FIG. **18** hereinbelow.

Advancing to function **618**, the process **600** builds a line index file **619** shown in FIG. **12***b* of discrete latitude and longitude points that define the polygon. Function **618** will be further described in conjunction with FIG. **19***a* and **19***b* hereinbelow.

Continuing to function **620**, the process **600** retrieves all the zip+4 records corresponding to the zip codes in the zip final list generated by function **616** and determines if the

zip+4 code is at or inside the polygon service area. If so, a record is written in a raw Client Table (not shown) that includes the zip+4 code, the client telephone number for the instant service location, and the distance of the zip+4 centroid to the service location. The function **620** will be further described in conjunction with FIG. **20** hereinbelow.

The process **600** moves to a decision state **622** to determine if additional client service records are to be processed. If so, the loop of states **610** to **620** is repeated for the next service location record. If all service location records have been processed for the instant raw Client Table, the process **600** advances to state **624**. At state **624**, the process **600** sorts the raw records, written by function **620**, by ascending zip+4 code and then by descending distance, if the same zip+4 code is listed more than once. The same zip+4 code could be listed more than once if there are multiple overlapping polygon service locations, each with a different client telephone number.

The process **600** then moves to a state **626** wherein the sorted Client Table from state **624** is loaded onto the computer of the telephone network switch **111**, and an index key on the zip+4 codes is built. Upon completion of state **626**, the Client Table build process **600** for a polygon defined service area ends at state **628**.

Referring generally to FIG. **14**, the function **612** defined in FIG. **12***a* will be described. Function **612** generates a list of zip windows that the site touches by first calculating site latitude and longitude extremes. For this function, the absolute value is used for both the latitude and longitude.

Beginning at a start state **670**, the process **600** moves to a state **672** to establish latitude extremes of the service area. The polygon file **607** is accessed to retrieve the polygon vertices latitude minimum and maximum values.

Site_lat_min=polygon_lat_min;

Site_lat_max=polygon_lat_max.

For the example service location and polygon given in Table 6, the results are as follows:

Site_lat_min=32.9503;

Site_lat_max=33.0187.

The process continues at state **674** wherein longitude extremes of the service area are established. The polygon vertices longitude minimum and maximum values are retrieved from the polygon file **607**.

Site_lon_min=polygon_lon_min;

Site_lon_max=polygon_lon_max.

For the example service location and polygon given in Table 6, the results are as follows:

Site_lon_min=117.2084;

Site_lon_max=117.2910.

States **676** and **678** are identical to states **258** and **260** of function **182** (FIG. **5**). As defined in FIG. **14**, function **680** (FIG. **15**) is identical to function **262** (FIG. **6**). Function **612** returns at state **682** to FIG. **12***a*.

As defined in FIG. **12***a*, function **614** (FIG. **16**) is identical to function **184** (FIG. **7**). As defined in FIG. **16**, function **752** (FIG. **17**) is identical to function **322** (FIG. **8**). As defined in FIG. **12***a*, function **616** (FIG. **18**) is identical to function **186** (FIG. **9**).

Referring to FIGS. **19***a* and **19***b*, the function **618** defined in FIG. **12***a* will be described. Function **618** builds the line index file **619** by rounding all modified polygon vertices latitudes and longitudes to an integer value, thereby creating a record of every discrete point along the line generated by connecting adjacent vertices listed in the polygon file **607**. The modification performed to the polygon vertices is subtracting the site_lat_min or site_lon_min as will be seen below.

Beginning at a start state **830**, the process **600** moves to a state **832** and initializes a variable J to equal the value one. Moving to state **834**, the process **600** initializes a tangent (denoted by "T" in FIG. **19**) array element addressed by the variable J to equal the value zero. At state **836**, a latitude array (denoted by "LAT" in FIG. **19**) element addressed by J is written to the value calculated by: subtracting site_lat_min (available from function **612**, FIG. **14**) from the vertices latitude (lat_vertices) addressed by J in the polygon file **607** (available from state **606**), multiplying the result by 10,000, and then taking the integer (INT) portion of the product. Advancing to state **838**, a longitude array (denoted by "LON" in FIG. **19**) element addressed by J is written to the value calculated by: subtracting site_lon_min (available from function **612**, FIG. **14**) from the vertices longitude (lon_vertices) addressed by J in the polygon file **607** (available from state **606**), multiplying the result by 10,000, and then taking the integer portion of the product.

At a decision state **840**, the process **600** determines if all vertices in the polygon file **607** have been processed. The number of vertices is available from state **606** as shown in the example in Table 6. If not, variable J is incremented by one at state **842**, and the process **600** loops back to state **834** to process the next vertices. If all vertices have been processed, variable J is set equal to the value two at state **844**.

States **846** through **860** are used to find vertices that are tangent to a latitude line. States **846** through **854** form a loop to sequence through all elements of the LAT array to determine if either of the conditions of decision states **846** or **850** are met. If so, the element of the tangent array addressed by J is set equal to one. If not, the next element is checked, by incrementing J at state **854** and looping back to state **846**, until the end of the LAT array is reached, i.e., all vertices are tested, and decision state **852** is true. Decision state **846** determines whether the values of the elements of array LAT immediately before and immediately after the current element are greater than the value of the current element. In other words, decision state **846** determines whether a latitude line is tangent to vertex(J). Decision state **850** determines whether the values of the elements of array LAT immediately before and immediately after the current element are less than the value of the current element. In other words, decision state **850** determines whether a latitude line is tangent to vertex(J).

When J equals the number of vertices minus one, the process **600** moves to states **856** through **860** to perform the follow tests:

decision state 856: If LAT(1) > LAT(2) AND LAT(1) > LAT(number_vertices-1) then T(J) = 1;
decision state 860: If LAT(1) < LAT(2) AND LAT(1) < LAT(number_vertices-1) then T(J) = 1.

Number_vertices is used to represent the number of vertices as available from state **606**. Decision states **856** through **860** test for a special case of previous states **846** through **854** to determine if vertex(1) is tangent to a latitude line. If so, the element of the tangent array addressed by J is set equal to one.

At state **862**, the process **600** sets variable J equal to one. Block **864** is an off page connector from FIG. **19***a* to FIG. **19***b*. Continuing on from block **864** on FIG. **19***b*, the process **600** generates a pseudo-line of discrete latitude points connecting the polygon vertices. Each point that defines the line is described by an X,Y coordinate. Each Y coordinate or latitude point is one ten-thousandth of a degree latitude apart on the Y axis.

Decision state **866** checks for parallel latitude lines, and if true, the process **600** moves to decision state **886** to determine if all vertices have been processed. If not, J is incremented by one at state **888**, and the process loops back to decision state **866** to check the next element of array LAT. If LAT(J) does not equal LAT(J+1) as determined by decision state **866**, the process **600** moves to state **868**, sets a variable K to equal the value of LAT(J), and moves to state **870**.

State **870** is used to leave out latitude tangent vertices points. State **870** determines if K is equivalent to LAT(J) and T(J) equals one. If so, the process **600** moves to decision state **882** to determine if K should be incremented by one at state **884**, or if K has reached the value "LAT(J+1)−1" and decision state **886** is to be performed. If K is incremented at state **884**, the process **600** loops back to decision state **870**.

If decision state **870** is false, the process **600** moves to state **872** to calculate a variable "delta_lat" to be "LAT(J) −LAT(J+1)". At state **874**, a variable "delta_lon" is calculated as the difference between the value of the array LON element addressed by J and the value of the array LON element addressed by J plus one. Moving to state **876**, a variable "lat_point" is set equivalent to the value of variable K. State **878** is used to calculate a longitude (variable "lon_point") for latitude line point using the following equation:

$$lon_point = INT[(K - LAT(J)) / delta_lat) * delta_lon + LON(J)].$$

Moving to state **880**, the process **600** writes the values of lat_point and lon_point to the line index file and then loops back to decision state **882** to check on the value of K.

At decision state **886**, if J equals the number of vertices minus one, all vertices have been processed, and the process **600** moves to state **890**. At state **890**, the process **600** sorts the line index file by ascending latitude point, and then by ascending longitude point within the latitude point. Moving to state **894**, process **600** builds the polygon line index file **619** using the latitude point as the indexing key. Function **618** returns at state **894** to FIG. **12***a*.

Referring to FIG. **20**, the function **620** defined in FIG. **12***a* will be described. Function **620** reads all zip+4 records as identified by the combination of the zip_final list and zip_pointer list, and determines if the zip+4 centroids are inside the polygon service area.

Beginning at a start state **910**, the states **912** through **918** are identical to states **422** through **428** of function **188** (FIG. **10**). Then beginning at state **920** through state **926**, the process **600** compares the latitude and longitude of the zip+4 centroid to the minimums and maximums of the site latitude and longitude available from function **612** (FIG. **14**). In other words, the process **600** determines if the zip+4 centroid is inside the latitude and longitude extremes of the polygon service area. If not, at state **928** the process **600** advances to point to the next zip+4 record and then loops back to state **918** to read the zip+4 record.

However, if the zip+4 centroid is determined to be inside the latitude and longitude extremes of the polygon service area by states **920** through **926**, the process **600** moves a function **930**. Function **930** is a final test to determine if the zip+4 centroid is indeed inside the polygon. The point-in-polygon test of function **930** returns with either an "inside" flag or "outside" flag. If the zip+4 centroid is not inside the polygon, the "outside" flag is set by function **930**, and the process **600** moves to state **928** to advance to the next zip+4 record. However, if the zip+4 centroid is inside the polygon, the "inside" flag is set by function **930**, and the process **600** moves to state **932** to perform a distance calculation. State **932** is identical to state **430** of function **188** (FIG. **10**). States **934** through **940** and **928** are identical to states **434** through **442** of function **188**. Function **620** returns at state **942** to FIG. **12***a*.

Referring to FIG. **21**, the function **930** defined in FIG. **20** will be described. Function **930** tests to determine if the zip+4 centroid is inside the polygon. Function **930** conceptually draws a line from the zip+4 latitude in a negative longitude direction and then counts the number of times the line crosses the polygon boundary. If the line crosses an odd number of times, the zip+4 centroid is inside the polygon, but an even number of line crossings determines that the zip+4 centroid is outside the polygon.

Beginning at a start state **960**, the process moves to state **962** to calculate a value for a variable "lat" by: subtracting site_lat_min (available from function **612**, FIG. **14**) from zip+4_lat (available from the zip+4 centroid file **100**), multiplying the result by 10,000, and then taking the integer (INT) portion of the product. Moving to state **964**, the process **600** calculates a value for a variable "lon" by: subtracting site_lon_ min (available from function **612**) from zip+4_lon (available from the zip+4 centroid file **100**), multiplying the result by 10,000, and then taking the integer portion of the product.

Moving to state **966**, the process **600** initializes the variable "count" to a value of zero and proceeds to state **968** to access the line index file **619**. At state **970**, the process **600** reads the polygon line index file **619** (available from function **618**, FIG. **19**) to retrieve the values for the variables "lat_point" and "lon_point". The process **600** advances in the polygon line index file **619** to the first occurrence of "lat" in the file by use of the file ISAM index. Moving to a decision state **972**, the process **600** determines if "lat_point" is greater than "lat". If "lat_point" is greater than "lat", then all records in the polygon line index file **619** have been read. If not, a test is performed at a decision state **974** to determine if "lon_point" is less than "lon". If "lon_point" is less than "lon", a line drawn from the zip+4 centroid toward negative infinity is defined to cross a polygon line. At state **976**, "count" is incremented by one to indicate the line crossing exists, and the process **600** loops back to state **970**. However, if decision state **974** is false, the process **600** loops back to state **970** to perform the next read of the line index file **619**.

If process **600** determines at decision state **972** that "lat_point" is greater than "lat", process **600** moves to a decision state **978** to check if "count MODULUS 2" is equal to zero. If so, an even number of line crossings exist, the "outside" flag is then set, and the function **930** returns at state **980** to FIG. **20**. If decision state **978** is false, i.e., "count MODULUS 2" is not equal to zero, an odd number of line crossings exist which denotes that the zip+4 centroid is inside the polygon. The process **600** sets the "inside" flag, and the function **930** returns at state **982** to FIG. **20**.

VII. Overview of Three Table System

A derivative of the Two Table system (Master and Client tables) shown in FIGs **1***b* and **1***c* is a Three Table system **1000**. Referring to FIG. **22**, the Three Table system **1000** is an enhancement to the two table system. The Master Table

1004 and the Client Table 1010 are used to determine the spatial service relationship of the caller provided telephone number and the servicing locations. The Master Table 1004 preferably has records with a field for a 10-digit telephone number 1006 and a field for a spatial key 1008 corresponding with the telephone number. A telephone number 1002 of the caller is generated by ANI or caller ID technology, or is provided by the caller, such as, for example, via entry on a touch tone keypad. The Client table 1010 preferably has records with a field 1008 for the spatial key, a field 1012 for the location ID, and a field 1014 for the distance and compass direction between the location corresponding to the spatial key and the location corresponding to the location ID.

The compass direction is expressed as the direction from the location corresponding to the spatial key (the caller location) to the location corresponding to the location ID (the service location) as one of the following eight values: E, NE, N, NW, W, SW, S, SE. This is determined in the client table build process by the sign and the ratio (TAN) of the delta latitude over the delta longitude, both expressed in miles. In polar coordinates, due East is 0° or 360°, and in this direction scheme, E is the segment between 337.5° and 22.5°. The other seven directions are defined in the order above by adding 45° in a counter clockwise manner to the previous direction maximum. For example, NE is 22.5° to 67.5°, N is 67.5° to 112.5°, and so forth.

However, in call processing where there are multiple service locations that service a caller, there is other service location dependent data that does not have any spatial attributes, e.g., hours open, days open, product inventories, that is required for selecting the best service location for the caller. This data is most efficiently stored in a third table 1016 called a Service Location table or a Client Location table. There is one record per service location in this table which is indexed by a service location ID 1012 or service location telephone number 1018. In some instances, the client may have fields for both the service location ID 1012 and service location telephone number 1018, and in other instances, only one of the fields, e.g., location ID, may be present. This table 1016 can also contain informational data 1024 in other fields, e.g., service location, name, address, general directions to a service location, a fax number, hours open 1020, days of week open, and so forth, that can be sent to the network and spoken to the caller by a Voice Response Unit. The service location telephone number is optionally sent to the network for connecting the caller to the service location.

The Three Table system 1000 provides the same benefits as the two table system plus it provides access to more information about the service location. With the access to the additional information, the caller may not need to talk to a person at the service location, thus saving time and resources for the client.

The service location ID may be an arbitrary code established by the client to uniquely identify each service location. One possible code is the telephone number of the service location. A service location ID that is not the servicing location telephone number provides the following additional benefits:

1. Supports locational information for locations that do not have a telephone, such as ATMs, Express Mail drop boxes and USPS drop boxes. Telephone communication with these locations is unavailable.

2. Provides an easier mechanism to update when a service location has a telephone number change: updating a single Service Location table record in contrast to updating many Client Table records in a Two Table system.

3. Provides an easier way for deleting or rerouting a service location that is temporarily or permanently unable to provide service.

VIII. Computer-Telephone Integration Network Configuration

Referring to FIG. 23, a preferred Three Table system network configuration 1120 will be described. The network configuration 1120 utilizes the tables described in conjunction with FIG. 22. A telephone call, placed at a calling telephone 1042, is first processed by a switch (not shown) at the Local Exchange Carrier (LEC), such as Pacific Bell or Southwest Bell, near the caller. The switch at the LEC assigns an Automatic Number Identification (ANI) that is independent of the telephone used. Caller ID technology provides an alternate way of getting the caller's number, but the technology is presently state regulated as to availability, and the technology can be blocked under certain circumstances. According to AT&T, over 98% of all switches currently assign and pass a 10-digit ANI. The call, and the ANI and Dialed Number Identification Service (DNIS) numbers are then passed through a national long-distance network carrier, such as AT&T, MCI, or Sprint, to a terminating switch. The terminating switch can be connected to another switch at the LEC servicing the terminating location or it can be connected directly to the long distance network, as is the case with an AT&T MEGACOM 800 switch or an AT&T MULTIQuest 900 switch. The preferred implementation in this Computer Telephone Integration (CTI) network is a direct connect to the AT&T long distance network 1043 using an AT&T 4 ESS switch 1044.

The terminating switch 1044 passes the call, ANI and DNIS to a Voice Response Unit (VRU) 1046. The VRU 1046, such as an AT&T Conversant System, is the hub in providing CTI. It has the ability to control call processing by accepting the voice signal, ANI and DNIS from the telephone network 1043, speaking recorded voice messages to the caller, translating caller voice commands, e.g., "1", "2", "3", "Yes" and "No", to computer data codes, translating computer text into synthesized speech and speaking it to the caller. The VRU 1046 also communicates with other telephone and computer network systems via communication protocols, such as ISDN and TCP/IP, over a Local Area Network (LAN) 1122 to obtain additional information required for processing the call and optionally connects the caller to a servicing location telephone, e.g., 1092*a*, or transfers the caller to the servicing location. The LAN 1122 is dual wired for redundancy.

The VRU 1046 first communicates with a Standard Query Language (SQL) database server 1124 to update, validate and determine the type of the caller-provided telephone number. The type of telephone number refers to whether it is a U.S. POTS telephone number or not, e.g., a non-POTS number may be for a pager or a cellular or personal communication service (PCS) telephone, and a non-U.S. number may be for a Canadian telephone. The caller-provided telephone number is either the result of a normal caller-initiated telephone call (ANI or Caller-ID), or as the result of state 1052 (FIG. 24) where the caller provides an alternate telephone number. The preferred SQL Server provider is Oracle. The preferred server is an AT&T 3600 UNIX box. Other servers or database software types may be used in other embodiments.

The database server 1124 has two databases that provide the information to update, validate and classify the telephone number. The first is a Bellcore NPANXX split file

1126. The "NPANXX" represents the first six digits of a ten digit telephone number, corresponding to area code and exchange. This file **1126** provides a list of NPANXXs that are in the process of being split into new area codes and exchanges. If the caller provided NPANXX is in this list, the caller's NPANXX is changed to the new NPANXX. Thus, the caller-provided telephone number is updated. Next, the caller's NPANXX is compared against Bellcore's V&H coordinate file **1128** which lists all valid NPANXXs and the types of telephone services supported by the NPANXX. Both the NPANXX Split File **1126** and the V&H coordinate file **1128** are extracts from Bellcore's Local Exchange Routing Guide (LERG). The LERG is the master database used by all common carriers for routing calls in the North American Dialing Plan telecommunications network. If the caller provided NPANXX is listed in the V&H file **1128** as a U.S. Plain Old Telephone Service (POTS) number, the caller's time zone and daylight savings time indicator are returned. If on the other hand, the caller's NPANXX's is invalid, the VRU **1046** requests the caller to provide another telephone number. If the NPANXX is valid, but a non-U.S. number, such as a Canadian telephone number, a cellular telephone number, or a special purpose telephone number, such as "NPA_555", a prerecorded message related to the caller's telephone type will be played to the caller and the caller will be asked to enter another telephone number, or the caller will be connected to an exceptions call handling operator **1132**.

If the caller's NPANXX is determined to be a valid U.S. POTS number, the VRU **1046** sends an inter-process communication request containing the caller-provided telephone number and DNIS to the routing processor **1140** which is a UNIX-based computer, such as an AT&T 3600, which has access to the Master Table **1004** and the Client Table **1010** corresponding to the DNIS. Of course, other routing processors or operating software types may be used in other embodiments. The routing processor **1140** processes the request and preferably returns a status code, and if successful, a list of service location IDs and distances, sorted in ascending distance order. If the returned status code is an unsuccessful type, the VRU **1046** either plays a prerecorded message for the caller or connects the caller to the exceptions handling operator **1132**.

If the routing processor request is returned as successful, the VRU **1046** then makes inquiries to the database server **1124** for the Service (client) locations database **1016** associated with the caller's DNIS and retrieves records associated with the service location IDs returned by the routing processor **1140**. These retrieved records contain information such as the service location telephone number, days and hours of operation, name, address and micro-area directions, time zone, daylight saving indicator, and so forth. Next the VRU **1046** determines which servicing locations are currently open to handle the caller's request. Depending upon the client application, the VRU **1046** provides to the caller, via recorded voice or synthesized text to speech, service location information and/or connects the caller directly with the closest or selected currently open serving location.

If the call requires operator exception handling, the VRU **1046** connects the caller to the operator **1132**, using a video display, through a CTI public branch exchange (PBX)/automatic call distributer (ACD) **1130** and host system **1134**. The PBX/ACD **1130**, such as a System 75 available from AT&T, provides the caller's voice to the operator **1132**. The host system is preferably a **3090** mainframe, available from IBM. The host system **1134** provides database data from the server **1124** on the operator's video display. The host system **1134** is supported by AT&T American Transtech in Jacksonville, Fla. The operator **1132** handles the request and passes the information required to connect the caller to a servicing dealer or terminate the call with a pre-recorded message back to the VRU **1046**.

There are two choices in connecting the caller to the servicing dealer. The VRU **1046** can generate a second call from the VRU **1046** to the servicing location and connect the caller to the servicing location through the VRU **1046**, or the VRU **1046** can use an AT&T advanced feature called Transfer Connect and transfer the call directly to the servicing dealer. The latter is the preferred implementation because it reduces telecommunications costs and VRU port capacity requirements.

The Servicing location answers the call using a conventional telephone **1092**. The servicing location can then handle the caller's request.

A Master table update is performed in a situation where a caller is trying to be connected to a servicing location and has provided a valid telephone number that is not in the Master Table. The call is transferred to the exceptions handling operator **1132** for whom the telephone number and DNIS are passed via ISDN to the host computer system **1134** and are shown on the operator's video display. The operator **1132** asks the caller for the caller's address and key enters it. The operator then presses a function key that calls a program which USPS standardizes the address and assigns a spatial key for the address. The operator **1132** confirms the standardized address with the caller. Having confirmed the standardized and Spatial Key coded address, the operator **1132** then presses another function key that passes the spatial key and the DNIS to a program that retrieves a list of servicing location(s) with corresponding telephone numbers on the video display of the operator. The operator asks the caller which location they prefer and then transfers the call by highlighting the selected service location and pressing another function key. The telephone number provided by the caller along with the associated spatial key are captured, stored on disk, and retrieved later by another process that updates the Master Table.

IX. Three Table System Example

Referring to FIGS. **22** and **24**, a central switch linking process **1040** will be described. The process is used to provide information to a caller and optionally interconnect a calling telephone **1042** and a destination telephone **1092** using the Three Table system **1000**. The process **1040** utilizes the network configuration **1080** described in FIG. **23**. The process **1040** is similar to process **108** shown in FIG. **1**c and previously described above. To avoid repetition, only the main differences between process **108** and process **1040** will be described. Note that the objective of process **108** is to route and connect the telephone call from the calling telephone to the destination telephone at the client service location. The objective of process **1040** is to provide information to the caller, and optionally route and connect the calling telephone to the destination telephone.

The process **1040** starts with the caller dialing, for example, an "800" type number using a conventional telephone **1042**. The telephone **1042** can either be a touch tone or a rotary telephone. With a touch tone telephone, the caller is able to provide input via the telephone key pad using Dual Tone Multi-Frequency (DTMF) or by voice. With the rotary telephone, input is limited to voice. There are numerous touch tone and rotary telephone manufacturers. They manufacture many differ makes and models, such as cordless

phones and cellular telephones. Alternately, the caller may initiate a call by the use of a computer having a DTMF tone generation circuit, such as a personal digital assistant (PDA).

The voice response unit (VRU) **1046** (FIG. **23**), having a call decoding capability, is utilized by the system **1000**. The VRU **1046** utilizes ANI and DNIS technology to generate an information packet **1048** containing a calling telephone number and a dialed telephone number. The VRU was previously described in conjunction with FIG. **23**.

At state **1050**, the process determines if the client has provided for optional client input. If so, the process **1040** moves to state **1052**, wherein the caller provides a telephone number of another person or business and therefore, a new associated location. The new telephone number can be entered by the caller using a DTMF keypad, e.g., on a touch tone telephone, by a computer or other device that can store touch tone data, or by speaking the information to the VRU. In other embodiments, other data may be entered or provided by the caller to enable other features of the system. In the presently preferred system **1000**, the process **1040** next proceeds to a decision state **1054** to determine if the telephone number obtained at state **1052** is valid. To determine validity, the system looks up the NPANXX portion of the telephone number in the NPANXX split file **1126** (FIG. **23**) and updates the telephone number, if required. The system then looks up the original or updated (as applicable) NPANXX in the V&H Coordinate file **1128** to determine if it is valid. If the original or updated NPANXX is valid, the system classifies the telephone number by type, i.e., whether or not the number is for a U.S. POTS telephone. If the telephone number is a valid U.S. POTS number, the process continues at state **1056**. If not, the process **1040** moves back to state **1052** to request that a new entry be made by the caller.

Function **1080** and states **1072**, **1082** and **1084** replace states **142** and **146** of FIG. **1c**. If it is determined at state **1070** that the current spatial key, which is a zip+4 code in the presently preferred embodiment, is in the Client Table, process **1040** moves to a decision state **1072**. At state **1072**, process **1040** determines if the record having the current zip+4 has a field containing a location ID. There can be more than one record having the current zip+4, i.e., there may be multiple client service locations having service areas that cover the zip+4 of the caller or caller-provided location. These records are tested at decision state **1072**. If no record having the current zip+4 has a location ID, process **1040** moves to state **1074** for routed call exception handling wherein, preferably, operator assistance **1132** (FIG. **23**) is provided to route the call, provide information, or take other action as determined by the client. If at least one record, having the current zip+4, has an associated location ID, as determined at state **1072**, process **1040** continues at function **1080** for final call processing. Function **1080** will be further described in conjunction with FIG. **25**.

At the completion of the final call processing function **1080**, three return paths are possible and are indicated by return designators. The currently active or set return designator is determined by a return test at a decision state **1082**. If a first return designator of "operator" is set, process **1040** moves to state **1074** for routed call exception handling. If a second return designator of "end" is set, process **1040** moves to an end state **1084**, terminates the present call, and ends process **1040**. If a third return designator of "connect" is set, process **1040** moves to state **1086** where an outbound calling module of the VRU **1046** attempts to make a voice connection. The switch **1044**, at state **1086**, sends the information packet over the telephone network **1043** (FIG. **23**) to ring at the telephone **1092** associated with the selected client service location.

X. Final Call Processing

Referring to FIG. **25**, the final call processing function **1080**, identified in FIG. **24**, will be described. Beginning at a start state **1180**, process **1040** moves to a state **1182** wherein data utilized by the function **1080** is accessed. This data preferably includes a list of service location IDs with an associated distance (from the service location to the location of the caller-provided telephone number) as determined from the records provided at states **1068–1072** (FIG. **24**). This list is ordered by distance, with the closest service location first. Proceeding to state **1184** and using the list accessed at state **1182**, process **1040** builds a list of open locations by accessing the service location table **1016** identified by the DNIS from the plurality of service location tables in the system **1000**. Using the data from state **1184**, the records having the identified location IDs and that are open at the time of the telephone call are compiled as an open list of "IN" records at state **1186**. Alternately, if the service location is unmanned, such as a mail courier drop-off box, the list is built for locations for which there is a pick-up later than the time of the telephone call. If no service location from the list of state **1182** is currently open, state **1184** preferably generates a list (state **1186**) of closest not-open service locations to the location of the caller-provided telephone number. Such a list of closest not-open service locations has a client-specified number (N) of locations, where the list is arranged in order of closest location being first. Thus, if any client locations in the list of state **1182** are open or have a pickup time after the time of the call, the list of state **1186** contains open locations, but if no locations are open or have a pickup time after the time of the call, the list of state **1186** contains not-open locations.

Continuing at a decision state **1188**, process **1040** determines if the locations in the list from state **1186** are open at the time of the telephone call. If not, i.e., there are no open locations at the time of the present telephone call, process **1040** moves to state **1190** and recites a message to the caller that "no locations are currently open". Proceeding to a decision state **1192**, process **1040** preferably presents three options to the caller. The first option is at state **1194**, wherein the caller hears a message spoken by the VRU **1046** (FIG. **23**): "The closest location not currently open is" followed by the service location name, address, distance and hours/days open. The message recited at state **1194** informs the caller that although all client service locations are currently closed, the name, address and open hours/days are provided for the client service location that is closest to the location of the caller-provided telephone number. At the completion of state **1194**, process **1040** returns to decision state **1192**. If the caller selects the first option again at decision state **1192**, the next closest location in the list of not-open locations from state **1186** is accessed at state **1194** and is recited to the caller by the VRU.

If the second caller option is chosen at decision state **1192**, process **1040** proceeds to state **1196**, wherein a return with a "end call" designator is performed. The final call processing function **1080** returns to the process **1040** (FIG. **24**) at state **1082**, wherein the system subsequently ends the telephone call.

If the third caller option is chosen at decision state **1192**, process **1040** proceeds to state **1198**, wherein a return with an "operator" designator is performed. The final call processing function **1080** returns to the process **1040** (FIG. **24**) at state **1082**, wherein the system subsequently accesses the operator.

Returning to decision state **1188**, if it is determined that at least one client location is open at the time of the telephone

call, process **1040** continues at state **1202**, wherein a variable "J" is initialized to a value of one. Moving to a decision state **1204**, process **1040** determines whether "J" is greater than the number of open list records "N", or if "J" is equal to zero. If so, process **1040** proceeds to state **1206** wherein the VRU **1046** (FIG. **23**) plays a "no more locations" message to the caller. The variable "J" is then set to a value of one at state **1208**. If the conditions at decision state **1204** are not true or at the completion of state **1208**, process **1040** moves to state **1210** wherein the location "J" from the open list (of state **1186**) is recited to the caller by the VRU **1046**, including the name and address of the service location, and the distance to the service location from the caller-provided telephone number.

Advancing to a caller options block **1212**, the VRU **1046** recites a list of eight preferable options for the caller to choose among for the next action performed. Other embodiments of the invention may include more options, less options, or a different set of options. The first option is "connect" at state **1214**. If this option is selected by the caller, the process **1040** moves to return state **1216**, wherein a return with a "connect" designator identifying the current ("J") record of the open list of locations is performed. The final call processing function **1080** returns to the process **1040** (FIG. **24**) at state **1082**, wherein the system subsequently attempts to connect the caller to the client service location.

The second option is "directions" at state **1218**. If this option is selected by the caller, the process **1040** moves to state **1220**, wherein the VRU **1046** speaks directions to the location identified in the current ("J") record of the open list of locations. The directions provided are pre-stored micro-area directions to the service location. These directions are usually used for service locations that are small in size, such as mail courier drop boxes or automated teller machines (ATMs) located in large physical entities, e.g., shopping centers or multi-story buildings. The micro-area directions are provided by the client and are stored in the service location file. "The drop box is located in the northeast corner of the ABC Shopping Center in front of the XYZ Drug Store" is an example of micro-area directions. At the completion of state **1220**, the caller is allowed to select an option from the caller options block **1212**.

The third option is "hours open" at state **1222**. If this option is selected by the caller, the process **1040** moves to state **1224**, wherein the VRU **1046** speaks the open hours for the location identified in the current ("J") record of the open list of locations. At the completion of state **1224**, the caller is allowed to select an option from the caller options block **1212**.

The fourth option is "repeat name" at state **1226**. If this option is selected by the caller, the process **1040** moves back to state **1210**, wherein the name, address and distance to the location "J" from the open list (of state **1186**) is recited to the caller by the VRU **1046**.

The fifth option is "previous location" at state **1228**. If this option is selected by the caller, the process **1040** moves to state **1230**, wherein "J" is set to the value of "J−1". Process **1040** then moves back to decision state **1204** to determine if an attempt is made to go to a improper service location record, i.e., which is not part of the open list of state **1186**.

The sixth option is "next location" at state **1232**. If this option is selected by the caller, the process **1040** moves to state **1234**, wherein "J" is set to the value of "J+1". Process **1040** then moves back to decision state **1204** to determine if an attempt is made to go to a improper service location record.

The seventh option is "operator" at state **1236**. If this option is selected by the caller, the process **1040** moves to return state **1198**, wherein a return with the "operator" designator is performed. The final call processing function **1080** returns to the process **1040** (FIG. **24**) at state **1082**.

The eighth option is "end call" at state **1238**. If this option is selected by the caller, the process **1040** moves to return state **1196**, wherein a return with the "end call" designator is performed. The final call processing function **1080** returns to the process **1040** (FIG. **24**) at state **1082**.

XI. Three Table System Table Build Process

The first two tables, the Master Table and the Client Table are created in a manner similar to that for the Two Table System. The major differences from that previously described will now be explained. The third table, the Client or Service Location Table **1016** (FIG. **22**) is generated using client supplied data for a set of client defined fields, as previously described. The client may optionally provide the location IDs in the location ID field **1012**. If the location IDs are not provided by the client, the location ID information is added to the Client Location Table **1016** during final preparation of the table.

One difference for building the Client Table is that the location IDs are needed for the client service locations file **109**, first described in FIG. **1***a*. Again, the client may optionally provide the location IDs in a modified file **109'**, or if the location IDs are not provided by the client, the location ID information is appended for each client service location prior to a client table build process **105'** (FIG. **1***a*) for the Three Table system. The result of the process **105'** is a Client Table (**1010**, FIG. **22**) having a location ID field in place of the client service location telephone number field (**106**, FIG. **1***a*).

Several other differences from the prior client table build process **105** are changes at state **434** of FIG. **10** and state **934** of FIG. **20**, wherein the "telephone number of client service location" is replaced by "location ID" for the new process **105'**. Further, at states **502**, **506**, **510** of FIG. **11**, "telephone number" is replaced by "location ID" for the new process **105'**.

The same Master Table that was used for the Two Table system can also be used in the Three Table system **1000**. Therefore, no further changes are necessary.

XII. Summary

The present invention utilizes telephone numbers as an index to a table containing partitions of a country into small geographic areas, such as postal service zip+4 codes. These partitions are further utilized to access one of a plurality of service locations that may be anywhere within the country.

The automated telephone routing system of the present invention provides the ability to reduce costs by routing a very high percentage of calls made to a single national telephone number without any human intervention and the marketing advantage for a client of a single, easy to remember, toll free or nominal fee national telephone number. The system also provides geographically precise results due to the use of all ten digits of the calling and called telephone numbers which correspond with the zip+4 codes for the locations of these numbers. The automated routing system provides the ability for a business to choose among different types of destination service area definitions. Preferably, a client may define each location's service area as an area with a radius of any size or a polygon of any size

and shape. A client can intermix radius and polygon definitions as well as have overlapping or non-overlapping service areas.

Flexibility is provided in defining how a particular client location is selected to terminate a call. A client is able to specify that a caller within a preselected radius of any distance (to a tenth of a mile) about a particular location is to be connected, or that the closest client location to the caller is to be connected; or that a caller within a preselected polygon about a particular client location is to connected, where the polygon edges can be any length. The polygon area can represent either an exclusive territory, or can overlap with other polygons of other client locations if the territory is non-exclusive. Additionally, each client location can have a different area type, with possibly different radii or dimensions, if required. Added flexibility is provided in the non-exclusive polygon type or radius type areas, wherein a random or weighted selection from multiple locations within the area is possible.

The present invention provides a method of routing all published and unpublished telephone numbers, including unlisted numbers, secondary unpublished business lines, and public pay phones without any violation of federal, state and local laws. The present invention also provides a method for legally conforming to contracted franchise territory definitions executed between franchisers and franchisees by routing customer's calls precisely to the correct legal franchisee area. Additionally, the present invention provides a method for precisely routing telephone calls based on any geographic definition including postal geography, census geography, telecommunications geography, special grid coordinate geography, and all custom geography.

The present invention provides a method for automatically routing and processing customer calls that do not meet the pre-set client protocols. This "exceptions handling" process routes the call to a "live" operator who executes preset exceptions handling protocols. The present invention also provides for a method of integrating unrelated geographic information systems and database technology, telecommunications systems and database technology, postal systems and database technology, and computer technology into a common applications driven architecture. Additionally, the present invention provides methods for automatically and independently updating both the Client and Master Tables, and instantly and dynamically linking these two tables during call processing. Furthermore, the present invention provides a method for automating the processing of information that is input by a customer using a customer interface that automatically routes telephone calls to customer requested destinations.

The two table system provides a single updatable Master Table (telephone number to Spatial Key) to support multiple clients, where each Client Table is updated independently from other Client Tables and from the Master Table. This design maximizes transaction processing capacity in terms of calls per second that can be connected to a servicing location when the Client Table contains the service location telephone number as the service location ID.

As another embodiment of the invention, the Three Table system provides the same benefits as the Two Table system plus it provides access to more information about the service location. When the location ID in the Client Table is not the servicing location telephone number, performance is reduced in terms of transactions per second for direct connect applications. However, the caller can automatically receive desired information about the service location or locations having a predetermined relationship to the caller location (or location identified by the caller). Optionally, the caller can be connected to the service location for a voice conversation. Information that can be received by the caller includes the client's service location name, the address, distance and compass direction to the service location, directions to the service location, days open, hours open, and so forth. The directions to the service location can be of varying scope depending on the needs of the client and/or types of locations. For well known places, such as a shopping center or a large multi-story building, micro-area directions provide the way to readily locate the service location within the center or building.

A benefit of the Three Table system is that since it is an enhancement of the Two Table system, it is relatively straightforward to implement. The same Master Table is used as for the Two Table system. The same Client Table building process as for the Two Table system is essentially used, but with a substitution of location ID for the client telephone number to allow more flexibility for the client.

While the above detailed description has shown, described, and pointed out the fundamental novel features of the invention as applied to various embodiments, it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated may be made by those skilled in the art, without departing from the spirit of the invention.

What is claimed is:

1. In a telephone network, an automated call processing system, comprising:

an automated communications subsystem capable of receiving a caller-provided telephone number;

means for determining a spatial key of the caller-provided telephone number;

means responsive to the spatial key for retrieving client service location information corresponding to a selected service location, wherein the service location is selected if a location associated with the caller-provided telephone number spatially lies within a service area defined by the client as a geographic configuration of substantially any desired shape and size around the service location;

means for communicating the selected service location and the retrieved client service location information to the caller;

means for receiving and responding to a caller's service location information request; and

an outbound calling module responsive to the caller's service location information request for transmitting the retrieved client service location information to the telephone network.

2. The system defined in claim 1, wherein the caller communicates with the selected service location by a routed telephone call.

3. The system defined in claim 1, wherein the telephone network comprises a computer-telephone integrated network.

4. The system defined in claim 1, wherein the selected service location is one of a list of service locations, and wherein the system further comprises:

means responsive to the retrieved client service location information for eliminating service locations from the list of service locations to generate a final list of service locations; and

means for communicating the final list of service locations and the retrieved client service location information to the caller.

5. The system defined in claim 1, wherein the automated communications subsystem additionally updates the caller-provided telephone number.

6. The system defined in claim 1, wherein the automated communications subsystem additionally validates the caller-provided telephone number.

7. The system defined in claim 1, wherein the automated communications subsystem additionally classifies the caller-provided telephone number.

8. The system defined in claim 1, wherein the automated communications subsystem comprises a voice response unit (VRU).

9. The system defined in claim 8, wherein the VRU utilizes automatic number identification (ANI).

10. The system defined in claim 8, wherein the VRU utilizes a dialed number identification service (DNIS).

11. The system defined in claim 8, wherein the VRU utilizes voice recognition.

12. The system defined in claim 1, wherein the caller utilizes a DTMF-capable device to supply the caller-provided telephone number.

13. The system defined in claim 1, wherein the means for communicating the selected service location and the retrieved client service location information to the caller utilizes a pre-recorded voice message.

14. The system defined in claim 1, wherein the means for communicating the selected service location and the retrieved client service location information to the caller utilizes a computer-synthesized text to speech capability.

15. The system defined in claim 1, wherein the retrieved client service location information comprises hours that the selected service location is open.

16. The system defined in claim 1, wherein the retrieved client service location information comprises days that the selected service location is open.

17. The system defined in claim 1, wherein the retrieved client service location information comprises first and last pickup times at the selected service location.

18. The system defined in claim 1, wherein telephonic communication with the selected service location is unavailable.

19. In a telephone network, a method of automatically processing a telephone call, comprising the steps of:

automatically generating a plurality of client tables each client table comprising a plurality of records, each record comprising a spatial key and client information indicative of a geographic location;

providing a location table for each client table, at least one of said location tables comprising a plurality of records, each record comprising a location identification (ID) and location-specific information;

storing the client tables, location tables, and a master table comprising a plurality of records, each record comprising a telephone number and a spatial key, in the telephone network;

receiving a calling telephone number and a dialed telephone number from the network;

indexing the master table with the received calling telephone number to obtain a master table record;

retrieving a spatial key from the master table record;

selecting one of the client tables based on the dialed telephone number;

indexing the selected client table with the retrieved spatial key to obtain a selected client table record;

retrieving a location ID from the selected client table record;

selecting one of the location tables based on the dialed telephone number;

indexing the selected location table with the retrieved location ID to obtain a selected location table record; and

retrieving client location information from the selected location table record.

20. The method defined in claim 19, additionally comprising the step of transmitting the retrieved client location information to the network.

21. The method defined in claim 19, wherein the step of generating a plurality of client tables comprises, for each client table, the step of providing a client service locations file containing a plurality of service location addresses, each service location having a client-defined geographic service area of substantially any desired shape and size.

22. The method defined in claim 21, wherein one of the service areas is defined by a radius.

23. The method defined in claim 21, wherein one of the service areas is defined by a polygon.

24. The method defined in claim 19, wherein the dialed telephone number is an "800" number.

25. The method defined in claim 19, wherein each spatial key uniquely identifies an area in a coordinate system.

26. The method defined in claim 25, wherein the coordinate system comprises longitude and latitude coordinates.

27. The method defined in claim 26, wherein one of the spatial keys comprises a zip+4 code.

28. The method defined in claim 25, wherein the coordinate system comprises Ordinance Survey coordinates.

29. The method defined in claim 19, wherein telephonic communication with the client location associated with the selected location table record is unavailable.

30. The method defined in claim 19, additionally comprising the step of updating a single location table record when a client location has a telephone number change.

31. An automated call processing system in a telephone network, comprising:

a switch connected to the telephone network;

a voice response unit (VRU) connected to the switch;

a routing computer with a memory connected to the VRU;

a master file comprising a plurality of records, each record having a telephone number and a spatial key, the master file accessible by the routing computer;

a plurality of client files, each client file comprising a plurality of records, each record having a spatial key and a client service location identification (ID), the client file accessible by the routing computer, and wherein records are assigned to the client file based upon the service location ID, with respect to a geographic area of substantially any desired shape and size;

a plurality of service location files, each service location file comprising a plurality of records, each record having a service location ID and service location-specific information;

means, associated with the VRU, for receiving a caller telephone number and a dialed telephone number from the telephone network;

means, associated with the VRU, for selecting one of the client files and one of the service location files, based on the dialed telephone number; and

means, associated with the VRU, for linking the master file, the selected client file and the selected service location file to produce selected client information

wherein the master file is indexed by the received caller telephone number to provide a selected spatial key, wherein the selected client file is indexed by the selected spatial key to provide a selected service location ID, and wherein the selected service location file is indexed by the selected service location ID to provide location-specific client information.

32. The system defined in claim **31**, additionally comprising means, associated with the VRU, to accept input from the caller and provide caller-selected information regarding a selected service location to the caller.

33. The system defined in claim **31**, additionally comprising an outbound calling module associated with the VRU for transmitting the selected client information to the telephone network.

34. The system defined in claim **31**, wherein the selected client information comprises a telephone number associated with a client service location identified by the selected service location ID.

35. The system defined in claim **34**, wherein after a client service location has a telephone number change, a telephone number associated with a single service location file record is updated.

36. The system defined in claim **31**, wherein the telephone network is a North American Standard public telephone network.

37. The system defined in claim **31**, wherein the switch comprises a digital trunk switching system.

38. The system defined in claim **31**, wherein the selected spatial key comprises a postal code.

39. The system defined in claim **38**, wherein the postal code comprises a zip+4 code.

40. The system defined in claim **31**, wherein the receiving means includes means for Automatic Number Identification (ANI).

41. The system defined in claim **31**, wherein the service location file is provided by the client.

42. The system defined in claim **31**, wherein the service location-specific information comprises at least one of the following: hours the service location is open, days the service location is open, location name, contact name, address of the service location, and telephone number of the service location.

43. The system defined in claim **31**, wherein telephonic communication with a service location indexed by the service location ID in the service location file is unavailable.

44. The system defined in claim **31**, wherein each client file record includes a distance designation, wherein said designated distance is from a centroid of the spatial key associated with the caller telephone number to a client service location stored in the record.

45. The system defined in claim **44**, wherein the location-specific client information includes the distance designation.

46. The system defined in claim **31**, wherein each client file record includes a compass direction, wherein said direction is from a centroid of the spatial key associated with the caller telephone number to a client service location stored in the record.

47. The system defined in claim **46**, wherein the location-specific client information includes the compass direction.

48. The system defined in claim **31**, wherein the routing computer is connected to the VRU by a computer network.

49. The system defined in claim **48**, wherein the master file and the service location files are accessible to the routing computer through the computer network.

50. In a telephone network, an automated call processing method, comprising the steps of:

receiving a caller-provided telephone number;

determining a spatial key of the caller-provided telephone number;

retrieving client service location information corresponding to a selected service location in response to the spatial key, wherein the service location is selected if a location associated with the caller-provided telephone number spatially lies within a service area defined by the client as a geographic configuration of substantially any desired shape and size around the service location;

communicating the retrieved client service location information to the caller;

receiving and responding to a caller's service location information request; and

transmitting the retrieved client service location information to the telephone network.

51. The method defined in claim **50**, additionally comprising the step of connecting the caller to the selected service location by utilizing the retrieved client service location information.

52. The method defined in claim **50**, wherein the telephone network comprises a computer-telephone integrated network.

53. The method defined in claim **50**, wherein the selected service location is one of a list of service locations, and wherein the method further comprises the steps of:

eliminating service locations from the list of service locations to generate a final list of service locations; and

communicating client service location information corresponding to the final list of service locations to the caller.

54. The method defined in claim **50**, additionally comprising the step of updating the caller-provided telephone number.

55. The method defined in claim **50**, additionally comprising the step of validating the caller-provided telephone number.

56. The method defined in claim **50**, additionally comprising the step of classifying the caller-provided telephone number.

57. The method defined in claim **50**, wherein the caller-provided telephone number is received from a DTMF-capable device.

58. The method defined in claim **50**, wherein the step of communicating the retrieved client service location information to the caller utilizes computer-synthesized text to speech capability.

59. The method defined in claim **50**, wherein the client service location information comprises first and last pickup times at the service location.

60. The method defined in claim **50**, wherein the client service location information comprises a telephone number corresponding to the service location.

61. The method defined in claim **50**, wherein telephonic communication with the service location is unavailable.

62. In an automated call processing system, including a master file, a plurality of client files and a plurality of service location files, for a telephone network, a method of call processing, the method comprising the steps of:

receiving a caller telephone number and a dialed telephone number from the telephone network;

selecting one of the client files and one of the service location files based on the dialed telephone number; and

linking the master file, the selected client file and the selected service location file to produce selected client

information wherein the master file is indexed by the received caller telephone number to provide a selected spatial key, wherein the selected client file is indexed by the selected spatial key to provide a selected service location identification (ID), and

wherein the selected service location file is indexed by the selected service location ID to provide location-specific client information.

63. The method defined in claim **62**, additionally comprising the step of transmitting the selected client information to the telephone network.

64. The method defined in claim **62**, wherein the selected client information comprises a telephone number associated with a client service location identified by the selected service location ID.

65. The method defined in claim **64**, additionally comprising the step of updating a telephone number associated with a single service location file record after a client service location has a telephone number change.

66. The method defined in claim **62**, wherein the selected spatial key comprises a postal code.

67. The method defined in claim **66**, wherein the postal code comprises a zip+4 code.

68. The method defined in claim **62**, wherein the service location-specific information comprises at least one of the following: hours the service location is open, days the service location is open, location name, contact name, address of the service location, and telephone number of the service location.

69. The method defined in claim **62**, wherein telephonic communication with a service location indexed by the service location ID in the service location file is unavailable.

70. The method defined in claim **62**, wherein the selected client file includes a record comprising a distance designation, wherein said designated distance is from a centroid of the spatial key associated with the caller telephone number to a client service location stored in the record.

71. The method defined in claim **70**, wherein the location-specific client information includes the distance designation.

72. In a telephone network, a method of automatically processing a telephone call, comprising the steps of:

providing a plurality of client tables, each client table comprising a plurality of records, each record comprising a location identification (ID);

providing a location table for each client table, at least one of said location tables comprising a plurality of records, each record comprising client location information;

storing the client tables, location tables, and a master table comprising a plurality of records, each record comprising a spatial key, in the telephone network;

receiving a calling telephone number and a dialed telephone number from the network;

indexing the master table with the received calling telephone number to obtain a master table record;

retrieving a spatial key from the master table record;

selecting one of the client tables based on the dialed telephone number;

indexing the selected client table with the retrieved spatial key to obtain a selected client table record;

retrieving a location ID from the selected client table record;

selecting one of the location tables based on the dialed telephone number;

indexing the selected location table with the retrieved location ID to obtain a selected location table record; and

retrieving client location information from the selected location table record.

73. The method defined in claim **72**, additionally comprising the step of transmitting the retrieved client location information to the network.

74. The method defined in claim **72**, additionally comprising the step of automatically generating the plurality of client tables.

75. The method defined in claim **74**, wherein the step of automatically generating the plurality of client tables comprises, for each client table, the step of providing a client service locations file containing a plurality of service location addresses, each service location having a client-defined geographic service area of substantially any desired shape and size.

76. The method defined in claim **75**, wherein one of the service areas is defined by a radius.

77. The method defined in claim **75**, wherein one of the service areas is defined by a polygon.

78. The method defined in claim **72**, wherein the dialed telephone number is an "800" number.

79. The method defined in claim **72**, wherein the dialed telephone number is an "888" number.

80. The method defined in claim **72**, wherein each spatial key uniquely identifies an area in a coordinate system.

81. The method defined in claim **80**, wherein the coordinate system comprises Ordinance Survey coordinates.

82. The method defined in claim **80**, wherein the coordinate system comprises longitude and latitude coordinates.

83. The method defined in claim **82**, wherein one of the spatial keys comprises a zip+4 code.

84. The method defined in claim **72**, wherein telephonic communication with the client location associated with the selected location table record is unavailable.

85. The method defined in claim **72**, additionally comprising the step of updating a single location table record when a client location has a telephone number change.

* * * * *

US005901214A

United States Patent [19]

Shaffer et al.

[11] Patent Number: 5,901,214

[45] Date of Patent: * May 4, 1999

[54] **ONE NUMBER INTELLIGENT CALL PROCESSING SYSTEM**

[75] Inventors: **James D. Shaffer**, Rancho Santa Fe, Calif.; **George G. Moore**, Great Falls, Va.

[73] Assignee: **Murex Securities, Ltd.**, Nassau, Bahamas

[*] Notice: This patent is subject to a terminal disclaimer.

[21] Appl. No.: **08/748,192**

[22] Filed: **Nov. 12, 1996**

Related U.S. Application Data

[60] Provisional application No. 60/019,526, Jun. 10, 1996.

[51] **Int. Cl.**[6] **H04M 3/42**

[52] **U.S. Cl.** **379/220**; 379/88.01; 379/88.13; 379/219; 379/223

[58] **Field of Search** 379/201, 127, 379/207, 211, 219, 220, 221, 67, 90.01, 93.24, 142, 265, 113, 112, 88.01, 88.13, 223

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Primary Examiner—Scott Wolinsky

Attorney, Agent, or Firm—Knobbe, Martens, Olson & Bear,LLP

[57] **ABSTRACT**

A one number, multi-application, intelligent call processing system provides service benefits to a caller, a servicing location and/or a vanity number advertiser during a call, parallel to the call and/or post call in an integrated common architecture. To provide these benefits, the system utilizes Voice Response Unit (VRU) technology in conjunction with the national telecommunications network connected via Computer Telephone Integration (CTI) to a virtual telephone number database containing a nation-wide master list of telephone numbers with thousands of attribute data items associated by Spatial Key linkage to each telephone number. The process of the invention is initiated by a caller dialing a selected telephone number to request information and/or services. Based on the number dialed, a caller or network provided 10 digit telephone number and VRU prompted for and received caller input, the system retrieves the application requested data from the virtual telephone number database. The application uses the retrieved information to direct the VRU to speak selected retrieved information to the caller that is desired by the caller or needs to be verified by the caller, to automatically connect the caller with a servicing location whose service area can be geographically defined as any size or shape and encompasses the caller provided telephone number's location, and/or to store portions of the received and retrieved information for later use.

58 Claims, 28 Drawing Sheets

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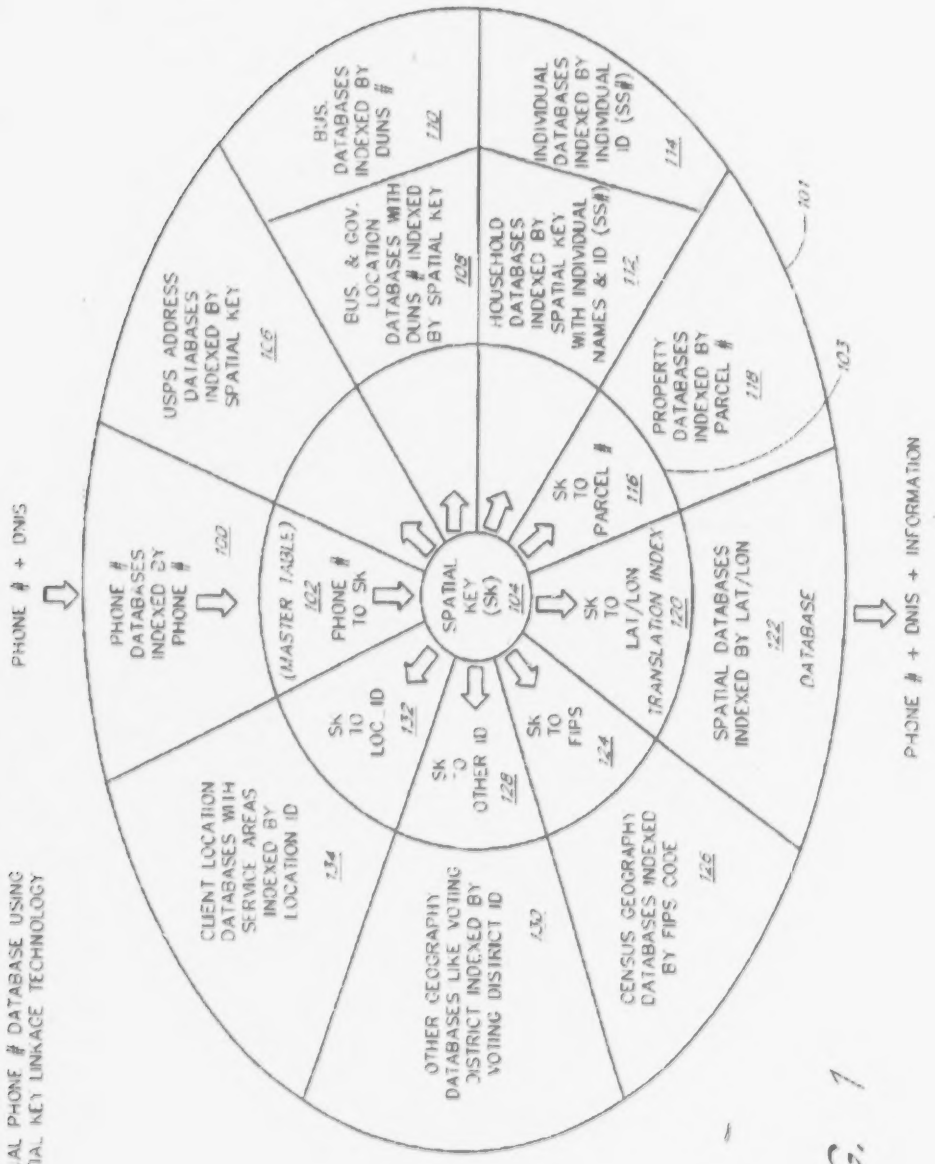

VIRTUAL PHONE # DATABASE USING
SPATIAL KEY LINKAGE TECHNOLOGY
PHONE # + DNIS
PHONE # DATABASES INDEXED BY PHONE # 100
(MASTER TABLE)
102
PHONE # TO SK
SPATIAL KEY (SK) 104
SK TO PARCEL # 106
SK TO LAT/LON TRANSLATION INDEX 120
SK TO LOC ID 132
SK TO OTHER ID 128
SK TO FIPS 124
USPS ADDRESS DATABASES INDEXED BY SPATIAL KEY 108
BUS. & GOV. LOCATION DATABASES WITH DUNS # INDEXED BY SPATIAL KEY 109
HOUSEHOLD DATABASES INDEXED BY SPATIAL KEY WITH INDIVIDUAL NAMES & ID (SS#) 112
BUS. DATABASES INDEXED BY DUNS # 110
INDIVIDUAL DATABASES INDEXED BY INDIVIDUAL ID (SS#) 114
PROPERTY DATABASES INDEXED BY PARCEL # 118
SPATIAL DATABASES INDEXED BY LAT/LON 122
DATABASE
CLIENT LOCATION DATABASES WITH SERVICE AREAS INDEXED BY LOCATION ID 134
OTHER GEOGRAPHY DATABASES LIKE VOTING DISTRICT INDEXED BY VOTING DISTRICT ID 130
CENSUS GEOGRAPHY DATABASES INDEXED BY FIPS CODE 126
101
103
PHONE # + DNIS + INFORMATION

FIG. 1

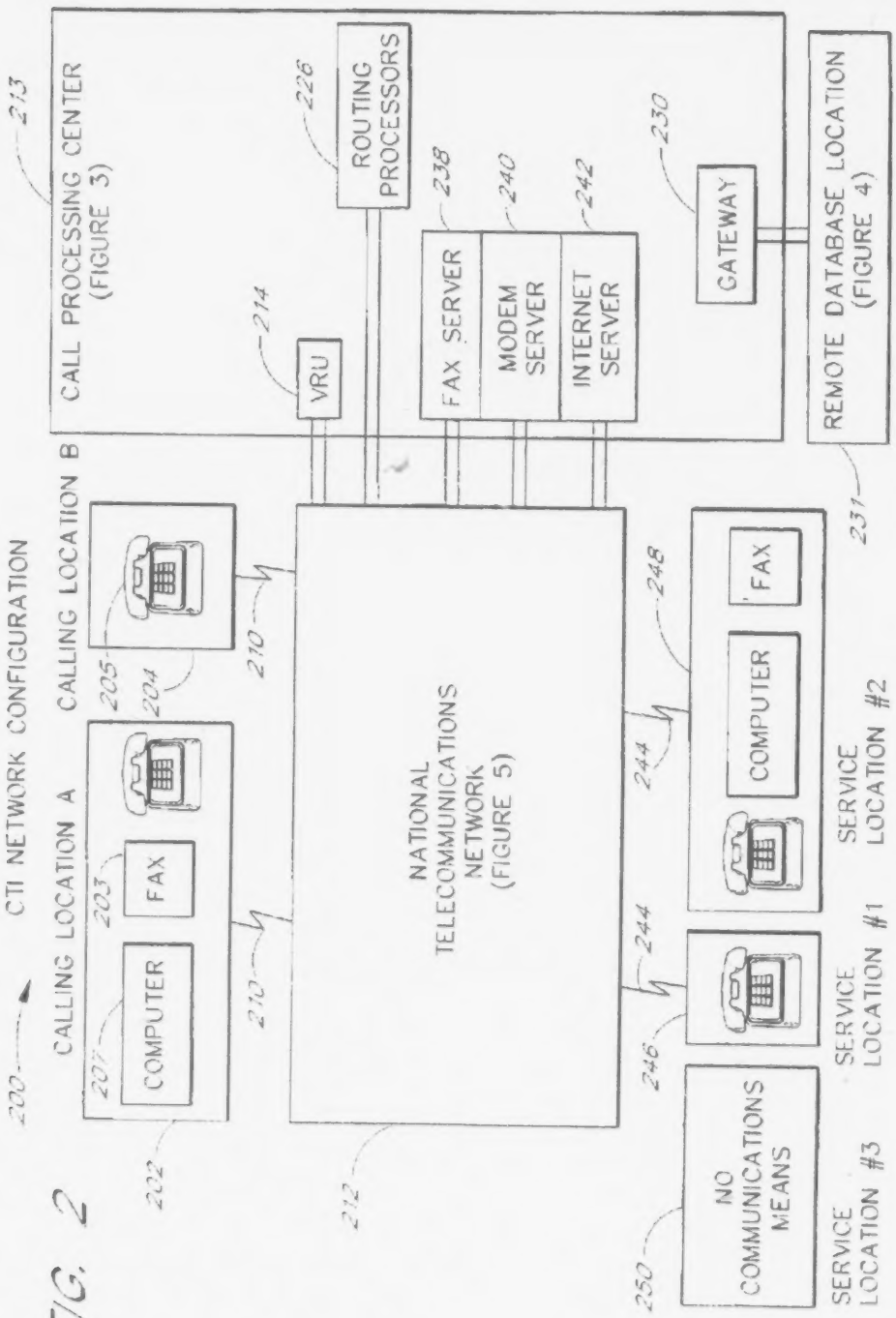

CTI NETWORK CONFIGURATION
200
CALLING LOCATION A
CALLING LOCATION B
COMPUTER
FAX
207
203
205
204
202
210
212
NATIONAL TELECOMMUNICATIONS NETWORK (FIGURE 5)
CALL PROCESSING CENTER (FIGURE 3)
213
VRU
214
ROUTING PROCESSORS
226
FAX SERVER
MODEM SERVER
INTERNET SERVER
238
240
242
GATEWAY
230
REMOTE DATABASE LOCATION (FIGURE 4)
231
244
246
248
SERVICE LOCATION #1
SERVICE LOCATION #2
SERVICE LOCATION #3
NO COMMUNICATIONS MEANS
250

FIG. 2

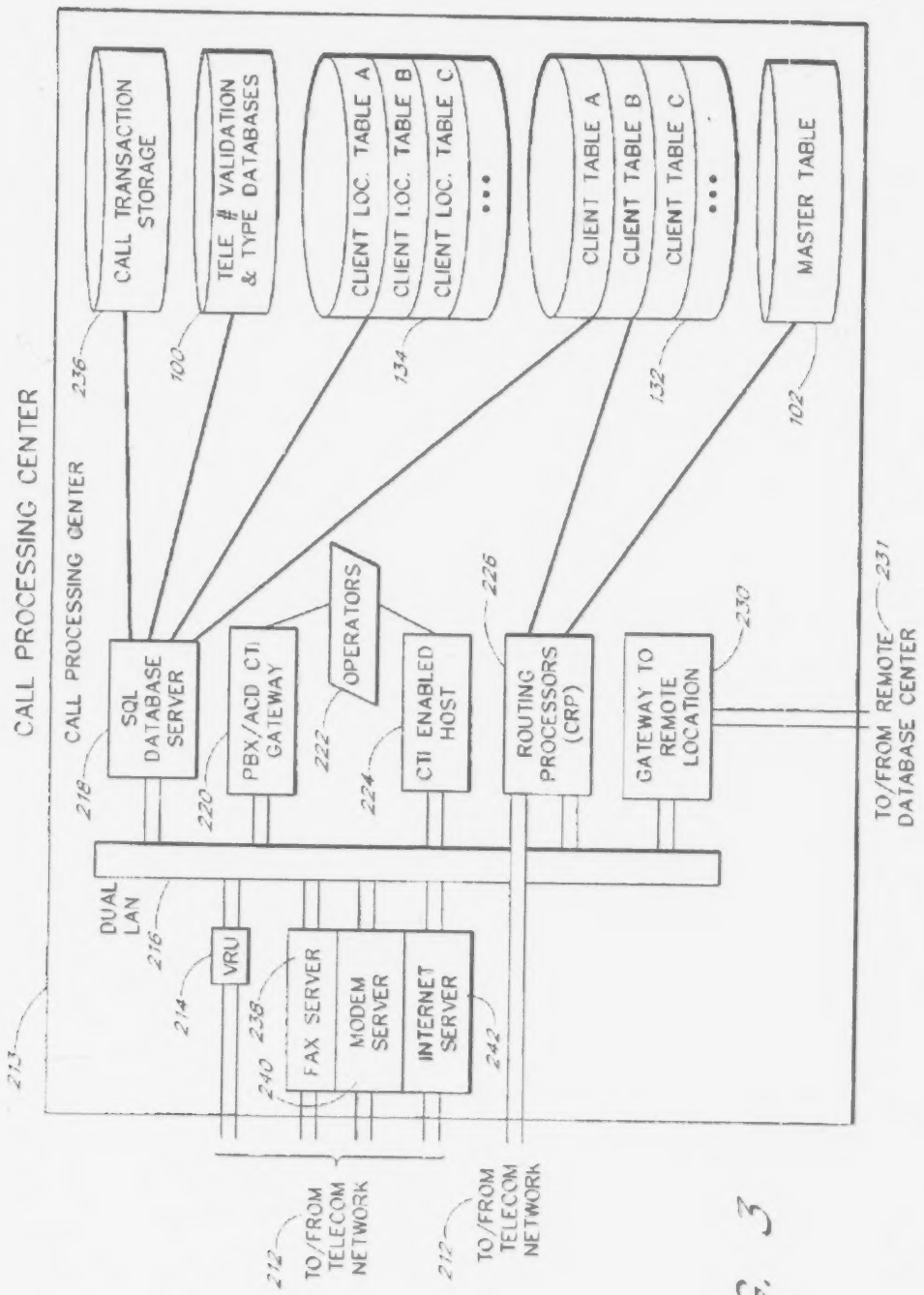

CALL PROCESSING CENTER
CALL PROCESSING CENTER
CALL TRANSACTION STORAGE
TELE # VALIDATION & TYPE DATABASES
CLIENT LOC. TABLE A
CLIENT LOC. TABLE B
CLIENT LOC. TABLE C
CLIENT TABLE A
CLIENT TABLE B
CLIENT TABLE C
MASTER TABLE
SQL DATABASE SERVER
PBX/ACD CTI GATEWAY
OPERATORS
CTI ENABLED HOST
ROUTING PROCESSORS (CRP)
GATEWAY TO REMOTE LOCATION
TO/FROM REMOTE DATABASE CENTER
DUAL LAN
VRU
FAX SERVER
MODEM SERVER
INTERNET SERVER
TO/FROM TELECOM NETWORK
TO/FROM TELECOM NETWORK
213
214
216
218
220
222
224
226
230
231
232
234
236
238
240
242

FIG. 3

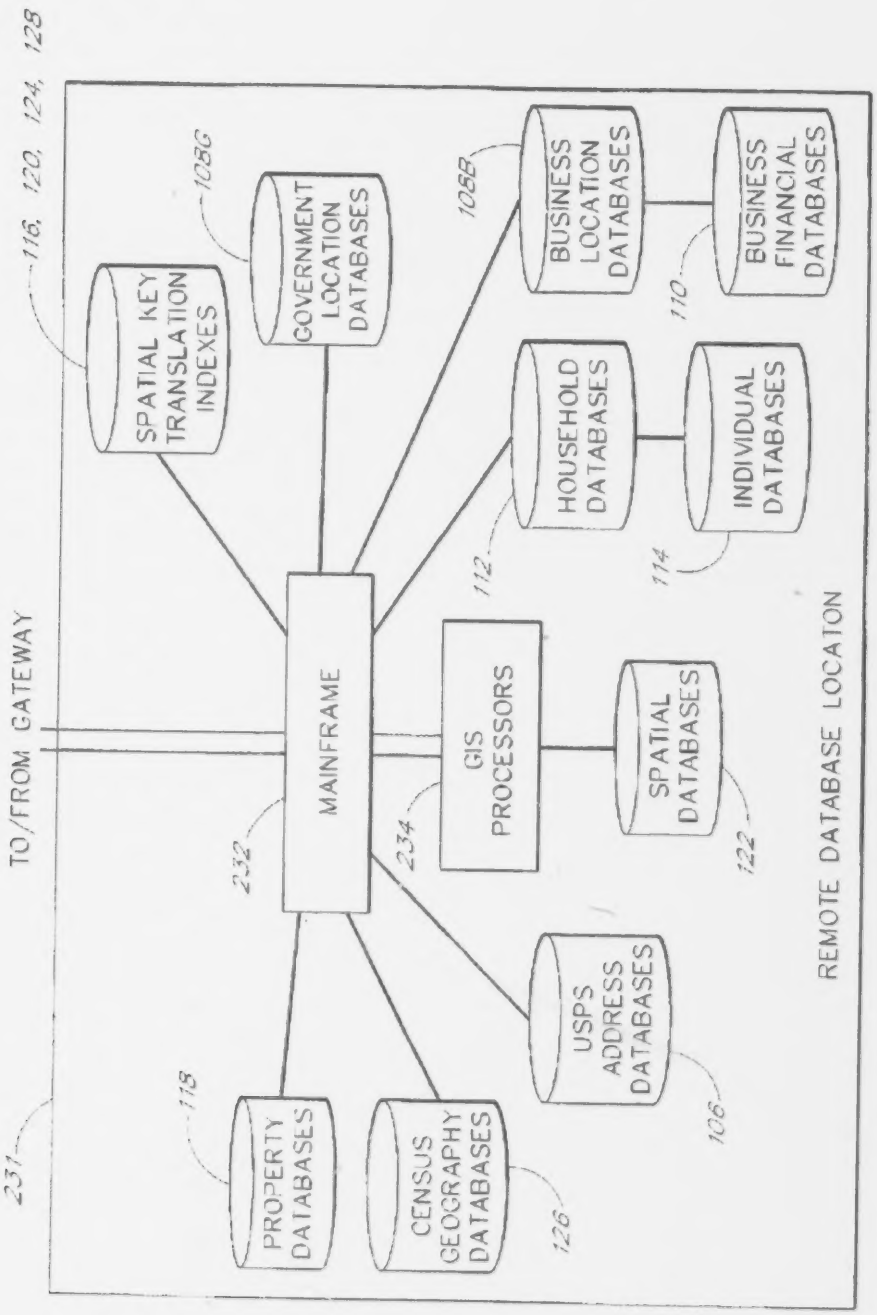

REMOTE DATABASE LOCATION
TO/FROM GATEWAY
MAINFRAME
GIS PROCESSORS
SPATIAL KEY TRANSLATION INDEXES
GOVERNMENT LOCATION DATABASES
BUSINESS LOCATION DATABASES
BUSINESS FINANCIAL DATABASES
HOUSEHOLD DATABASES
INDIVIDUAL DATABASES
SPATIAL DATABASES
USPS ADDRESS DATABASES
PROPERTY DATABASES
CENSUS GEOGRAPHY DATABASES
231
232
234
116, 120, 124, 128
105G
105B
110
112
114
122
106
118
126

FIG. 4

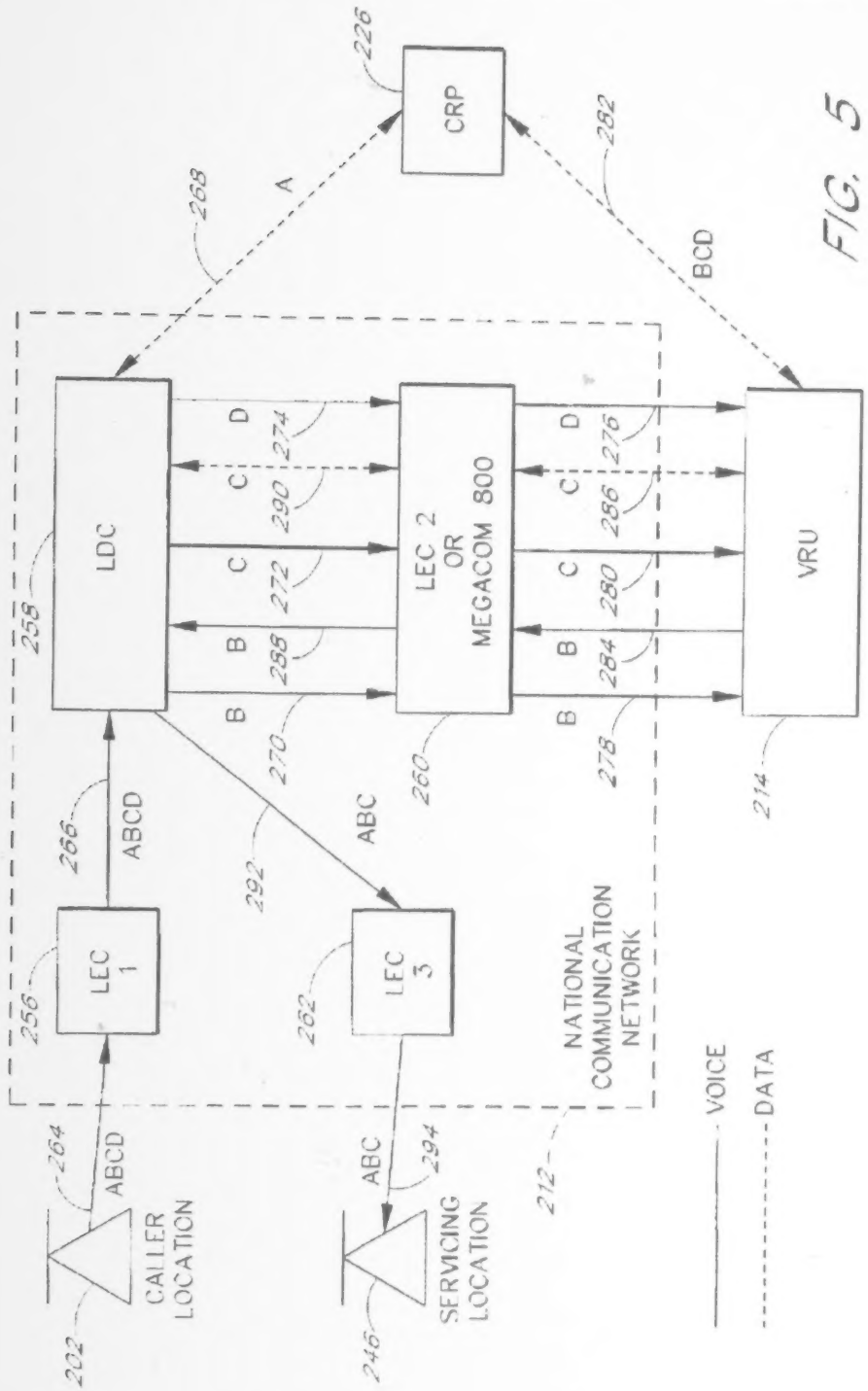
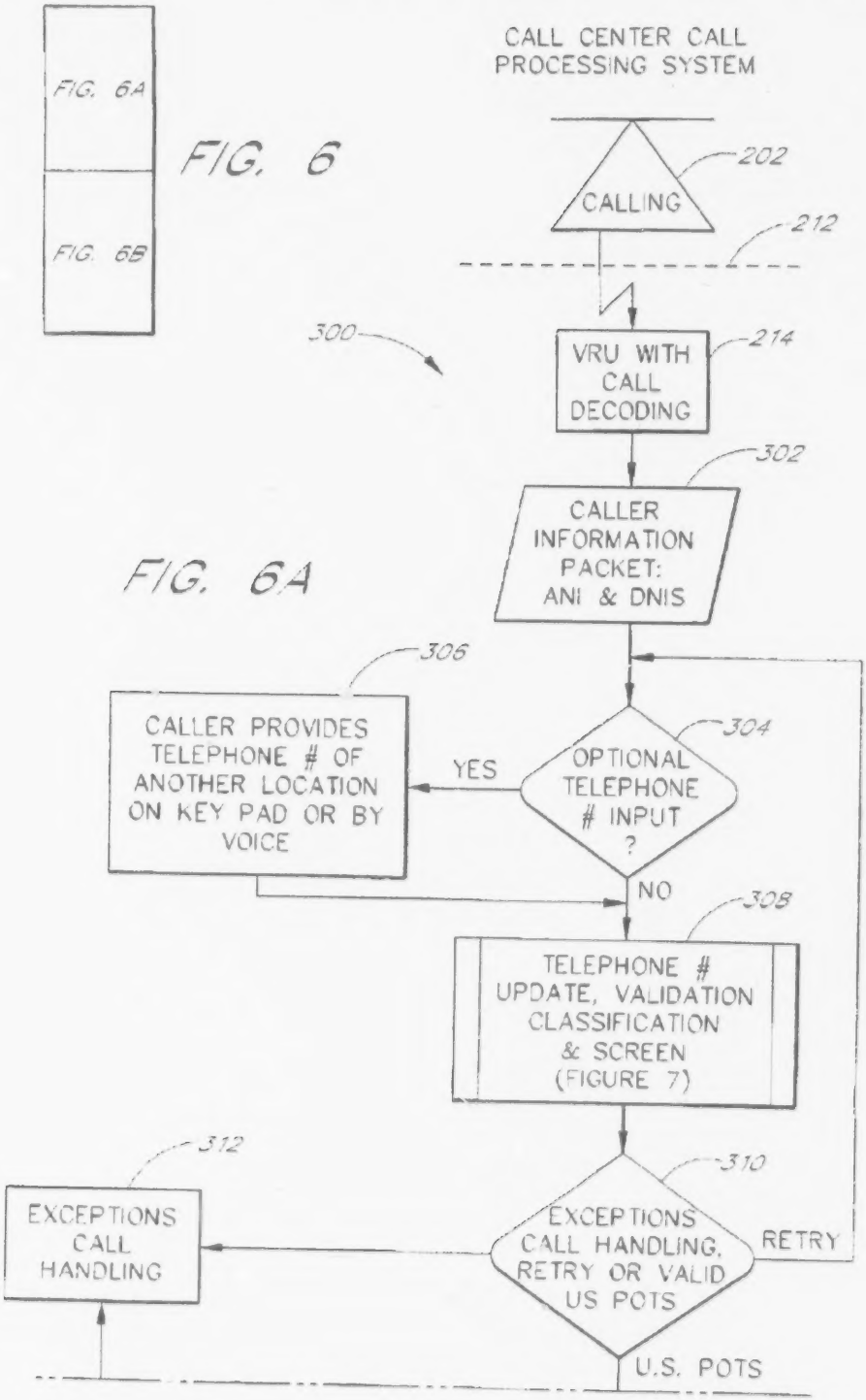

226
CRP
268
A
282
BCD
LDC
258
LEC 2
OR
MEGACOM 800
260
VRU
214
D
C
B
274
290
272
288
270
276
286
280
284
278
ABCD
266
ABC
292
LEC
1
256
LEC
3
262
NATIONAL
COMMUNICATION
NETWORK
212
264
ABCD
CALLER
LOCATION
202
ABC
294
SERVICING
LOCATION
246
VOICE
DATA

FIG. 5

FIG. 6

FIG. 6A
FIG. 6B

FIG. 6A


CALL CENTER CALL PROCESSING SYSTEM
CALLING
202
212
300
VRU WITH CALL DECODING
214
302
CALLER INFORMATION PACKET: ANI & DNIS
306
CALLER PROVIDES TELEPHONE # OF ANOTHER LOCATION ON KEY PAD OR BY VOICE
YES
304
OPTIONAL TELEPHONE # INPUT ?
NO
308
TELEPHONE # UPDATE, VALIDATION CLASSIFICATION & SCREEN (FIGURE 7)
312
EXCEPTIONS CALL HANDLING
310
EXCEPTIONS CALL HANDLING, RETRY OR VALID US POTS
RETRY
U.S. POTS

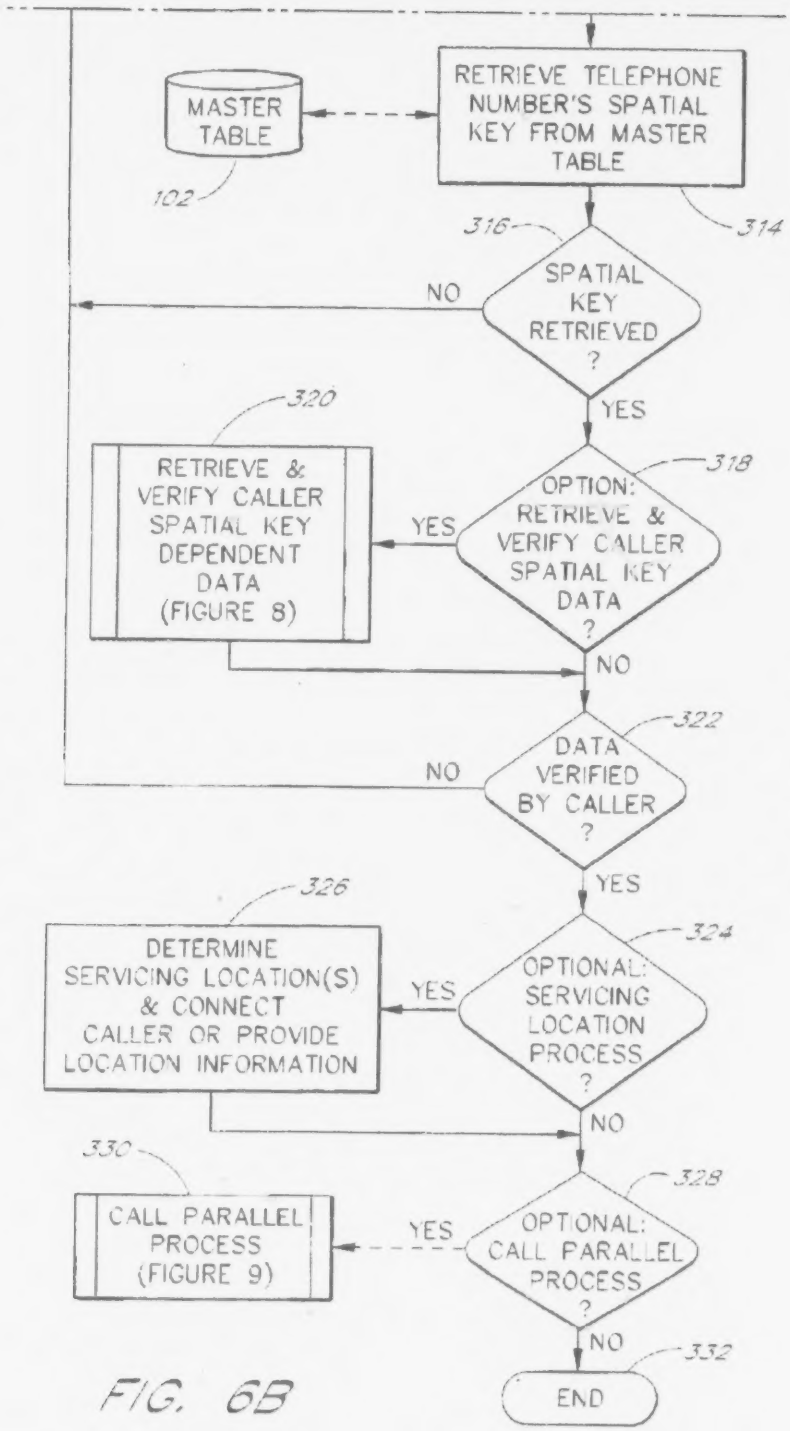

MASTER TABLE
102
RETRIEVE TELEPHONE NUMBER'S SPATIAL KEY FROM MASTER TABLE
314
316
SPATIAL KEY RETRIEVED ?
NO
YES
320
RETRIEVE & VERIFY CALLER SPATIAL KEY DEPENDENT DATA (FIGURE 8)
318
OPTION: RETRIEVE & VERIFY CALLER SPATIAL KEY DATA ?
YES
NO
322
DATA VERIFIED BY CALLER ?
NO
YES
326
DETERMINE SERVICING LOCATION(S) & CONNECT CALLER OR PROVIDE LOCATION INFORMATION
324
OPTIONAL: SERVICING LOCATION PROCESS ?
YES
NO
330
CALL PARALLEL PROCESS (FIGURE 9)
328
OPTIONAL: CALL PARALLEL PROCESS ?
YES
NO
332
END

FIG. 6B

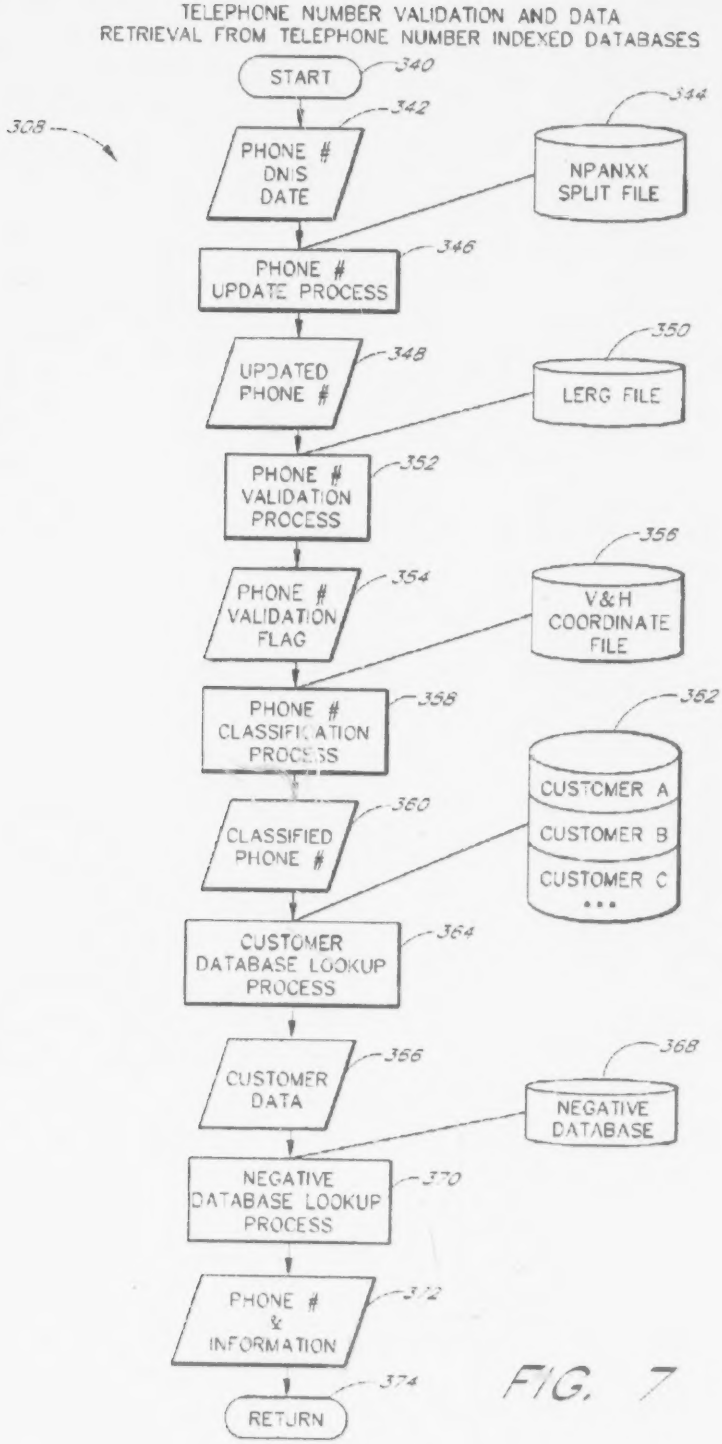

TELEPHONE NUMBER VALIDATION AND DATA RETRIEVAL FROM TELEPHONE NUMBER INDEXED DATABASES
308
START
340
PHONE # DNIS DATE
342
NPANXX SPLIT FILE
344
PHONE # UPDATE PROCESS
346
UPDATED PHONE #
348
LERG FILE
350
PHONE # VALIDATION PROCESS
352
PHONE # VALIDATION FLAG
354
V&H COORDINATE FILE
356
PHONE # CLASSIFICATION PROCESS
358
CLASSIFIED PHONE #
360
CUSTOMER A
CUSTOMER B
CUSTOMER C
...
362
CUSTOMER DATABASE LOOKUP PROCESS
364
CUSTOMER DATA
366
NEGATIVE DATABASE
368
NEGATIVE DATABASE LOOKUP PROCESS
370
PHONE # & INFORMATION
372
RETURN
374

FIG. 7

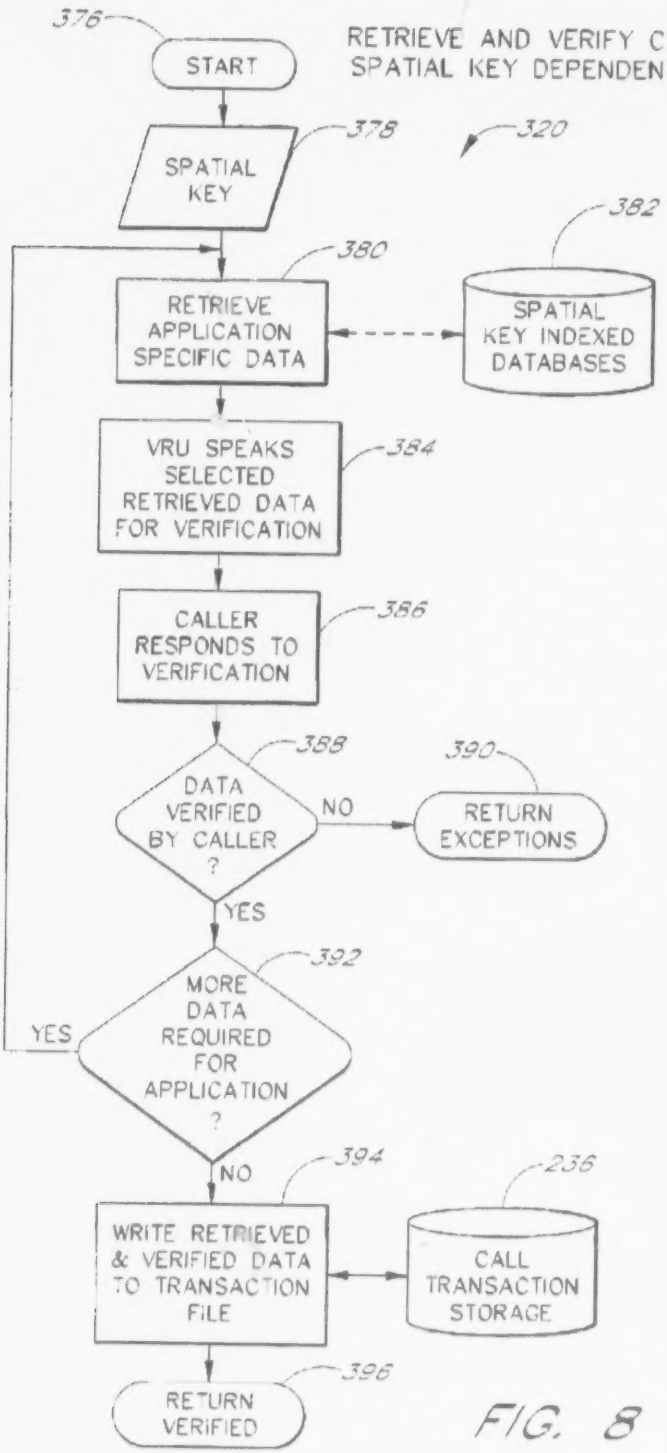

376
START
RETRIEVE AND VERIFY CALLER'S SPATIAL KEY DEPENDENT DATA
378
SPATIAL KEY
320
382
380
RETRIEVE APPLICATION SPECIFIC DATA
SPATIAL KEY INDEXED DATABASES
VRU SPEAKS SELECTED RETRIEVED DATA FOR VERIFICATION
384
CALLER RESPONDS TO VERIFICATION
386
388
DATA VERIFIED BY CALLER ?
NO
390
RETURN EXCEPTIONS
YES
392
MORE DATA REQUIRED FOR APPLICATION ?
YES
NO
394
236
WRITE RETRIEVED & VERIFIED DATA TO TRANSACTION FILE
CALL TRANSACTION STORAGE
396
RETURN VERIFIED

FIG. 8

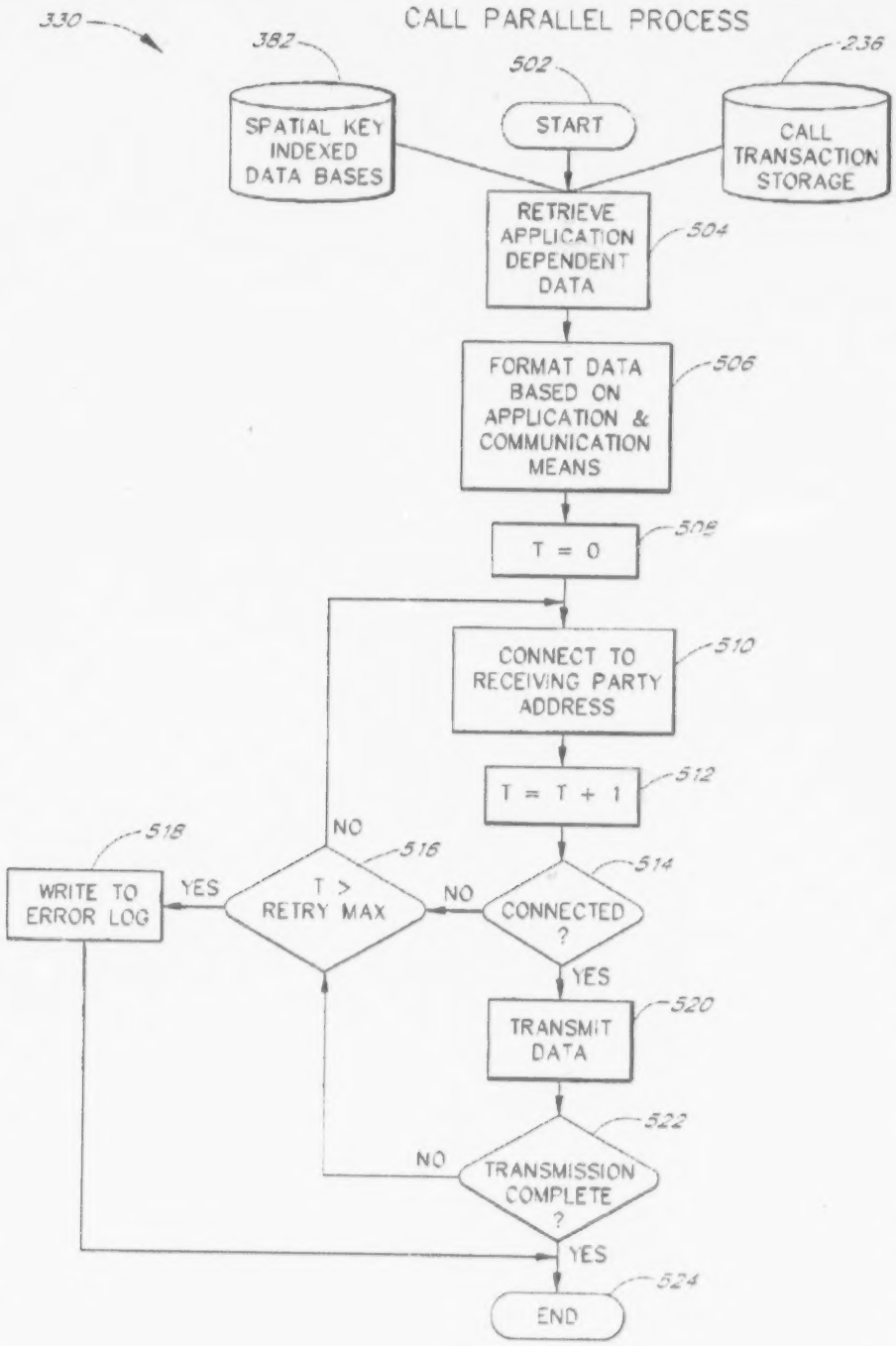

330
CALL PARALLEL PROCESS
382
SPATIAL KEY INDEXED DATA BASES
502
START
236
CALL TRANSACTION STORAGE
RETRIEVE APPLICATION DEPENDENT DATA
504
FORMAT DATA BASED ON APPLICATION & COMMUNICATION MEANS
506
T = 0
508
CONNECT TO RECEIVING PARTY ADDRESS
510
T = T + 1
512
CONNECTED ?
514
NO
T > RETRY MAX
516
YES
WRITE TO ERROR LOG
518
NO
YES
TRANSMIT DATA
520
TRANSMISSION COMPLETE ?
522
NO
YES
END
524

FIG. 9

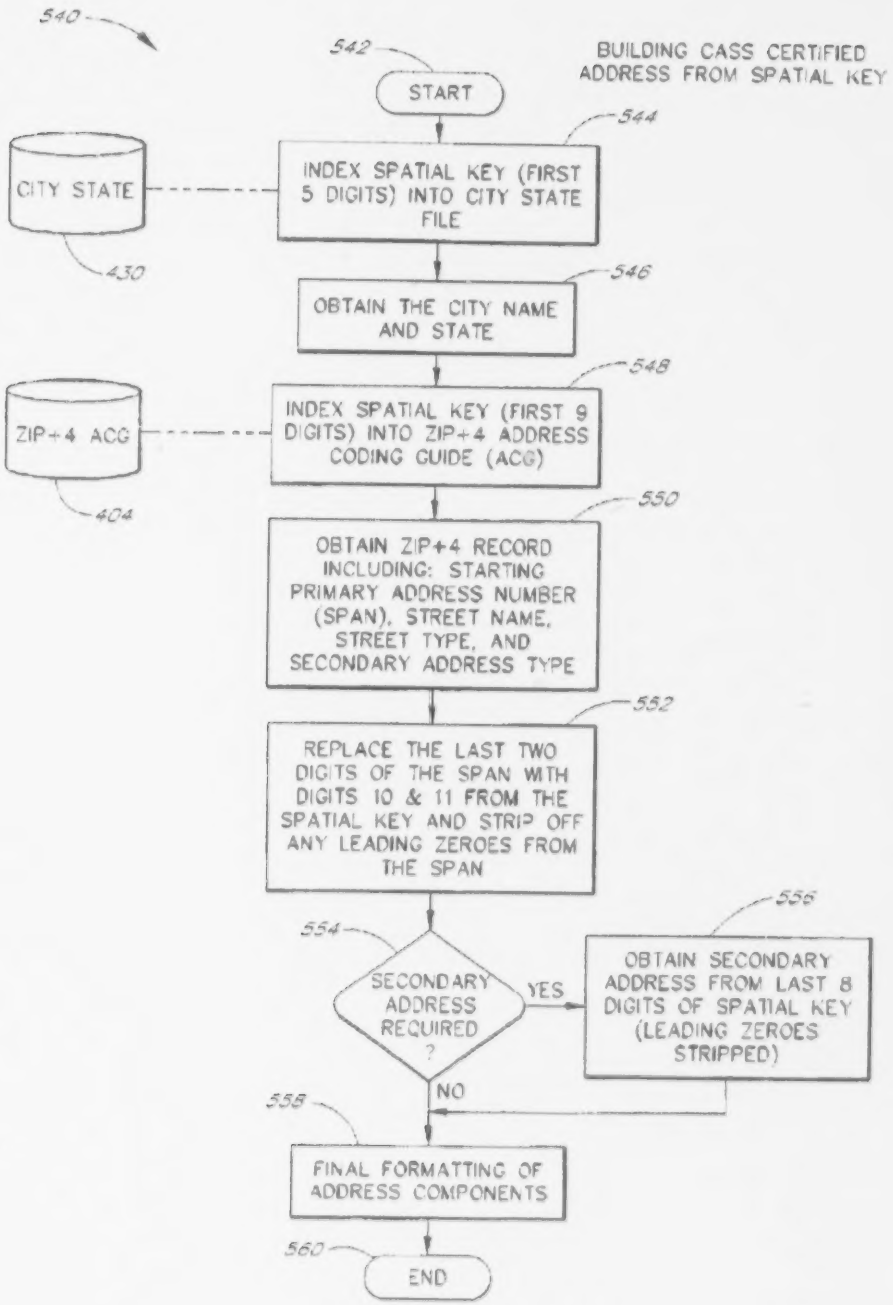

540
542
START
BUILDING CASS CERTIFIED ADDRESS FROM SPATIAL KEY
544
INDEX SPATIAL KEY (FIRST 5 DIGITS) INTO CITY STATE FILE
CITY STATE
430
546
OBTAIN THE CITY NAME AND STATE
548
INDEX SPATIAL KEY (FIRST 9 DIGITS) INTO ZIP+4 ADDRESS CODING GUIDE (ACG)
ZIP+4 ACG
404
550
OBTAIN ZIP+4 RECORD INCLUDING: STARTING PRIMARY ADDRESS NUMBER (SPAN), STREET NAME, STREET TYPE, AND SECONDARY ADDRESS TYPE
552
REPLACE THE LAST TWO DIGITS OF THE SPAN WITH DIGITS 10 & 11 FROM THE SPATIAL KEY AND STRIP OFF ANY LEADING ZEROES FROM THE SPAN
554
SECONDARY ADDRESS REQUIRED ?
YES
556
OBTAIN SECONDARY ADDRESS FROM LAST 8 DIGITS OF SPATIAL KEY (LEADING ZEROES STRIPPED)
NO
558
FINAL FORMATTING OF ADDRESS COMPONENTS
560
END

FIG. 10

PROCESS FOR DATA PROVIDER TO PROVIDE MASTER TABLE VERIFICATION RECORDS

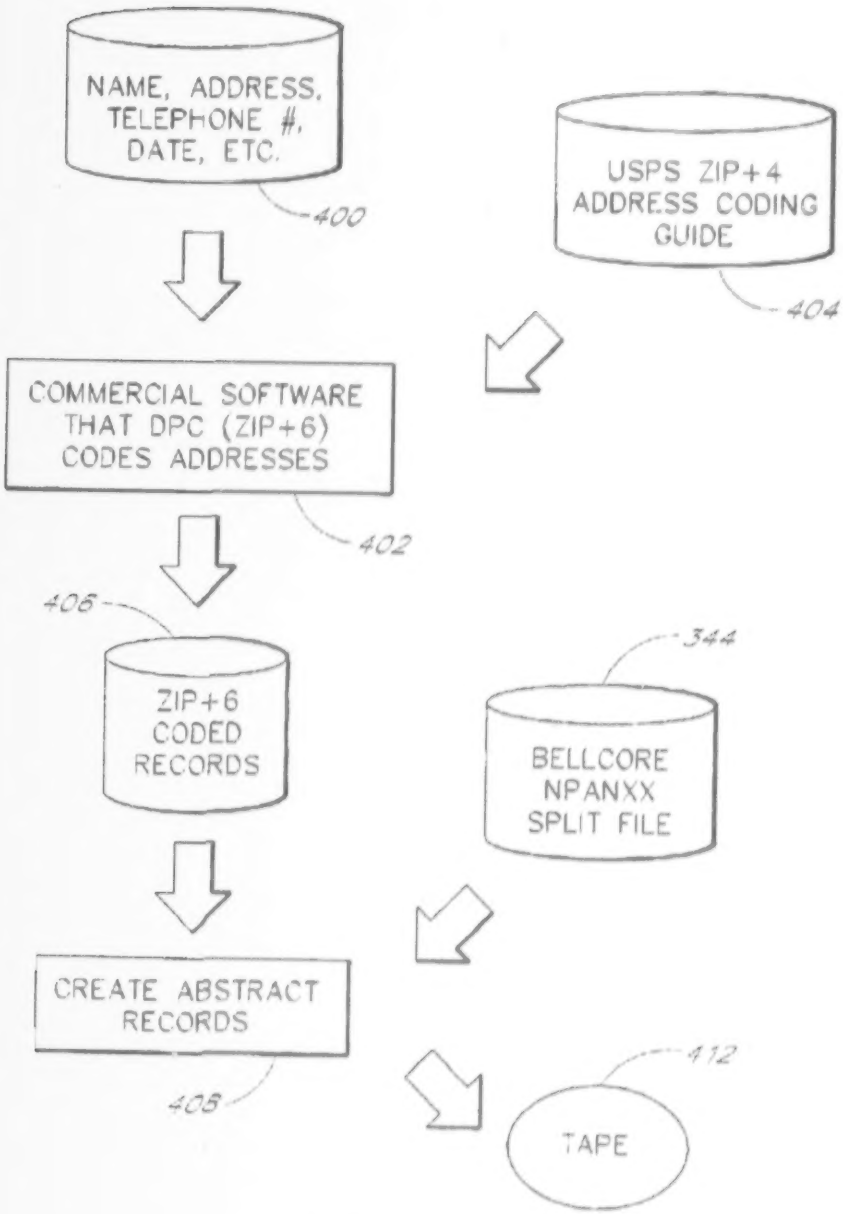


FIG. 11A

PROCESS TO BUILD MASTER TABLE UPDATE RECORDS FROM DATA PROVIDER SUPPLIED VERIFICATION RECORDS

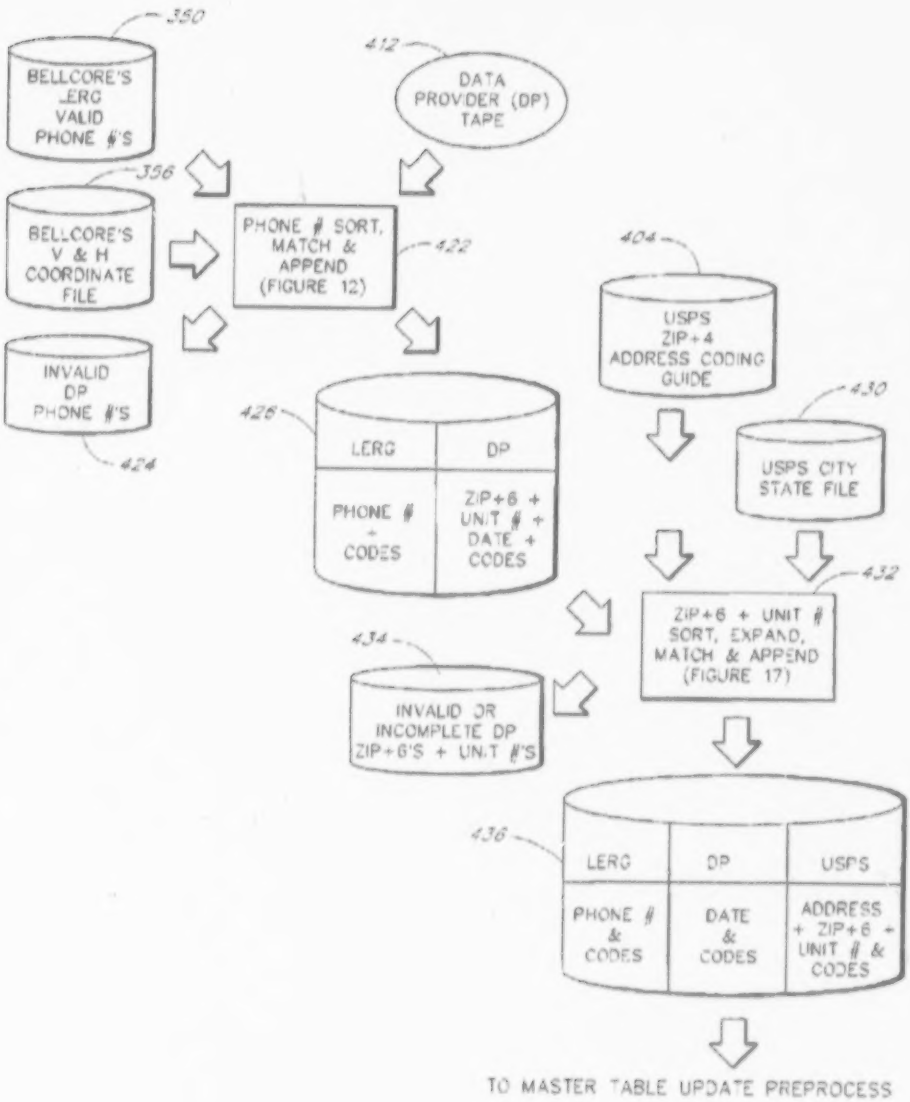


FIG. 11B

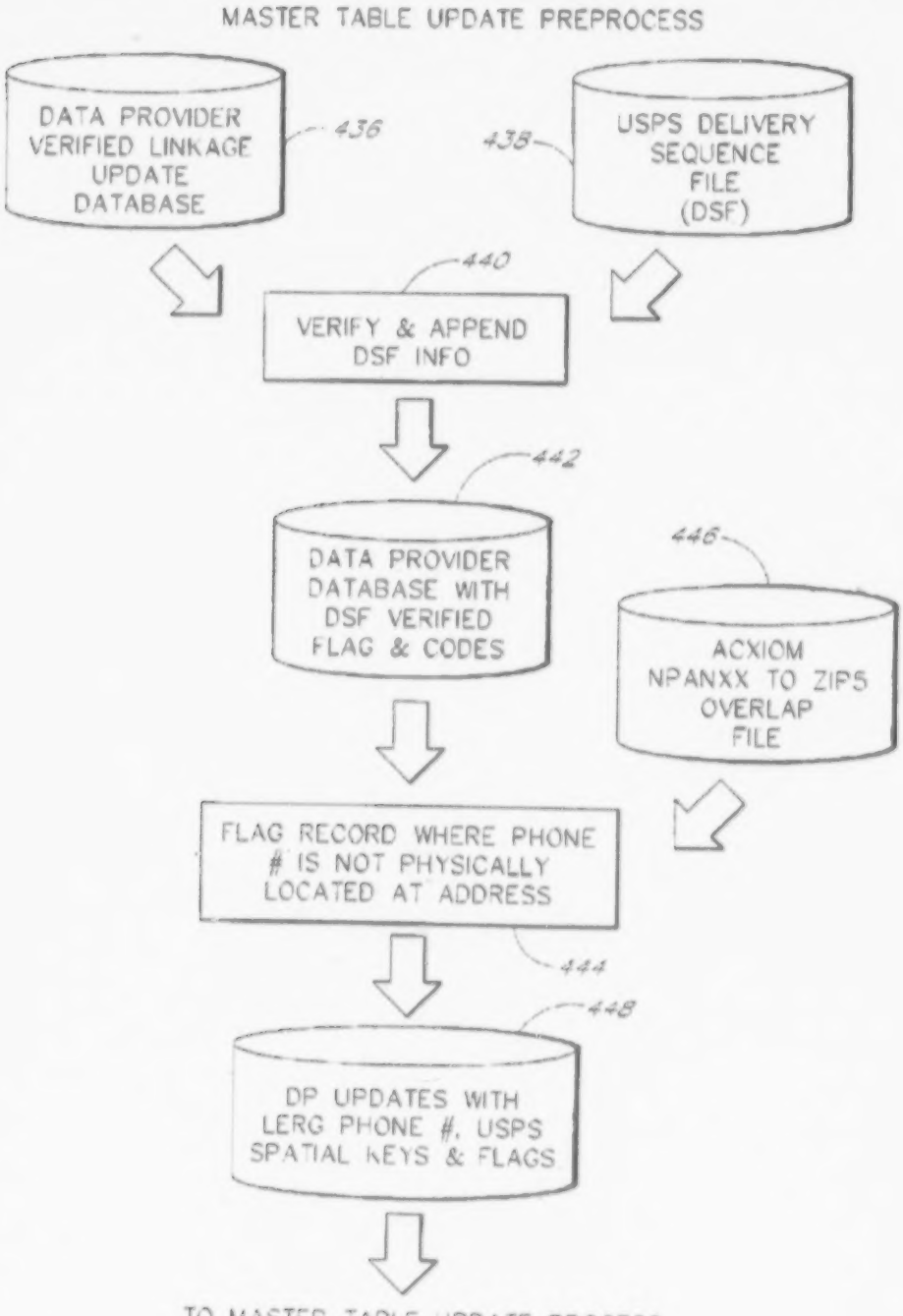

MASTER TABLE UPDATE PREPROCESS
DATA PROVIDER VERIFIED LINKAGE UPDATE DATABASE
436
438
USPS DELIVERY SEQUENCE FILE (DSF)
440
VERIFY & APPEND DSF INFO
442
DATA PROVIDER DATABASE WITH DSF VERIFIED FLAG & CODES
446
ACXIOM NPANXX TO ZIPS OVERLAP FILE
FLAG RECORD WHERE PHONE # IS NOT PHYSICALLY LOCATED AT ADDRESS
444
448
DP UPDATES WITH LERG PHONE #, USPS SPATIAL KEYS & FLAGS
TO MASTER TABLE UPDATE PROCESS

FIG. 11C

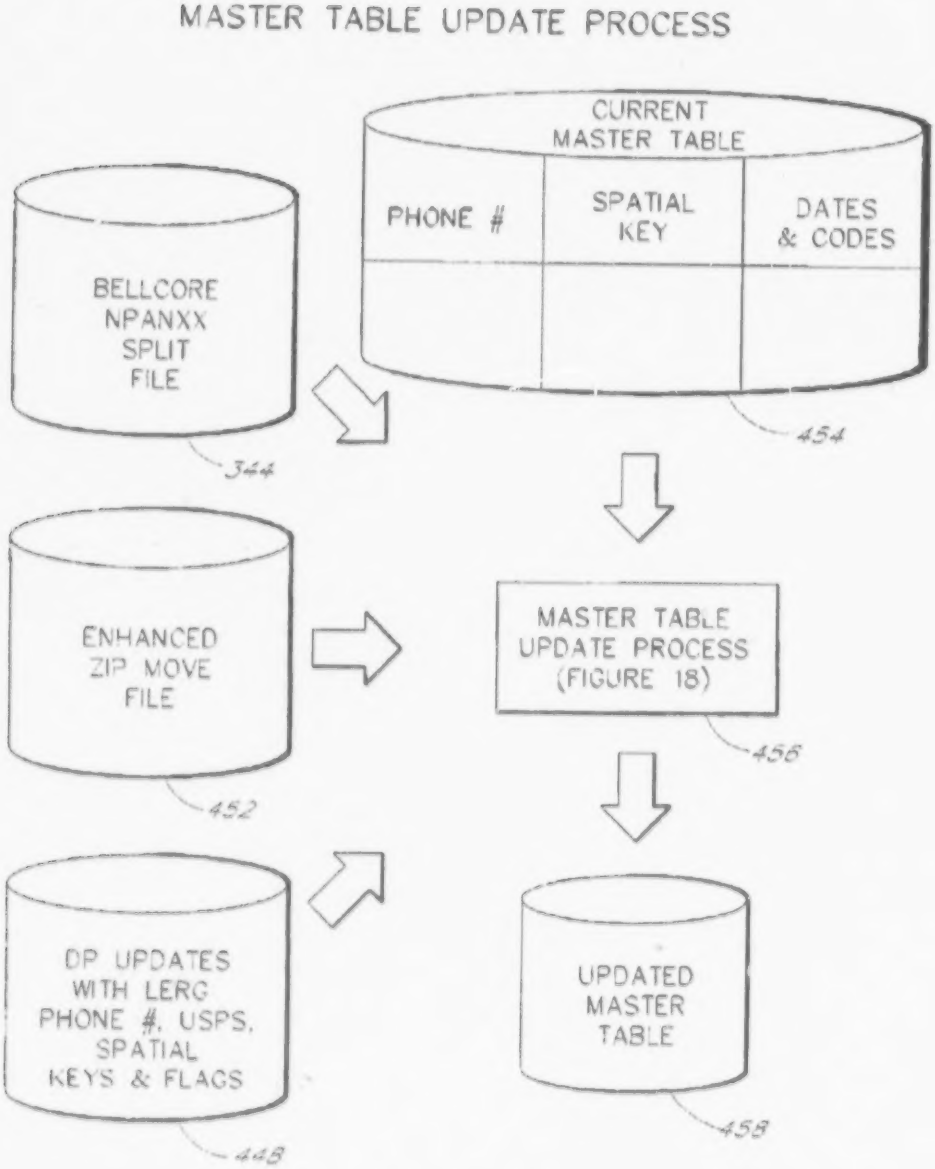

MASTER TABLE UPDATE PROCESS
CURRENT MASTER TABLE
PHONE #
SPATIAL KEY
DATES & CODES
454
BELLCORE NPANXX SPLIT FILE
344
ENHANCED ZIP MOVE FILE
452
MASTER TABLE UPDATE PROCESS (FIGURE 18)
456
DP UPDATES WITH LERG PHONE #, USPS, SPATIAL KEYS & FLAGS
448
UPDATED MASTER TABLE
458

FIG. 11D

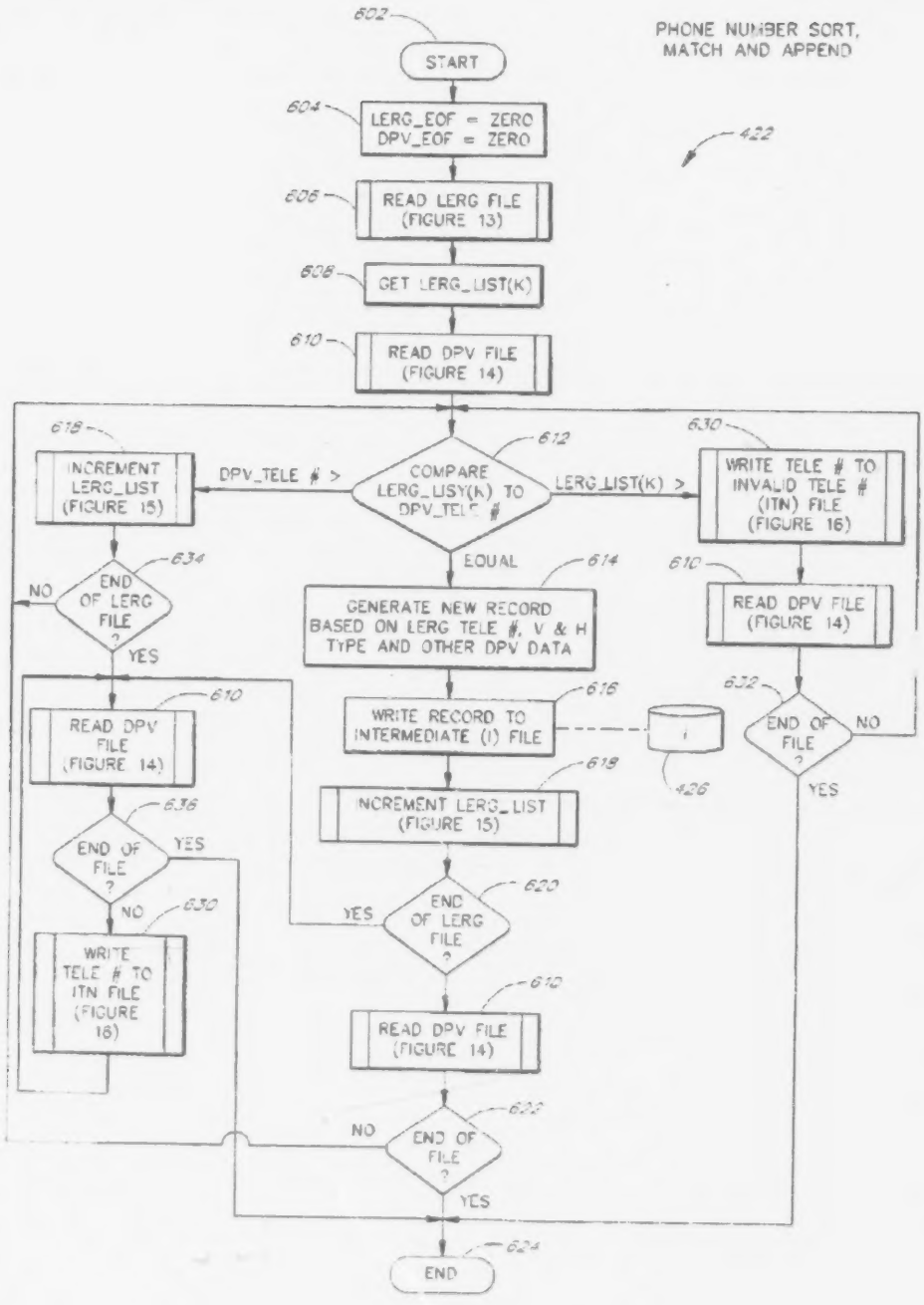

PHONE NUMBER SORT, MATCH AND APPEND
422
602
START
604
LERG_EOF = ZERO
DPV_EOF = ZERO
606
READ LERG FILE (FIGURE 13)
608
GET LERG_LIST(K)
610
READ DPV FILE (FIGURE 14)
612
COMPARE LERG_LIST(K) TO DPV_TELE #
DPV_TELE # >
LERG_LIST(K) >
EQUAL
618
INCREMENT LERG_LIST (FIGURE 15)
630
WRITE TELE # TO INVALID TELE # (ITN) FILE (FIGURE 16)
634
END OF LERG FILE ?
NO
YES
614
GENERATE NEW RECORD BASED ON LERG TELE #, V & H TYPE AND OTHER DPV DATA
610
READ DPV FILE (FIGURE 14)
616
WRITE RECORD TO INTERMEDIATE (I) FILE
I
426
632
END OF FILE ?
NO
YES
610
READ DPV FILE (FIGURE 14)
636
END OF FILE ?
YES
NO
630
WRITE TELE # TO ITN FILE (FIGURE 16)
618
INCREMENT LERG_LIST (FIGURE 15)
620
END OF LERG FILE ?
YES
610
READ DPV FILE (FIGURE 14)
622
END OF FILE ?
NO
YES
624
END

FIG. 12

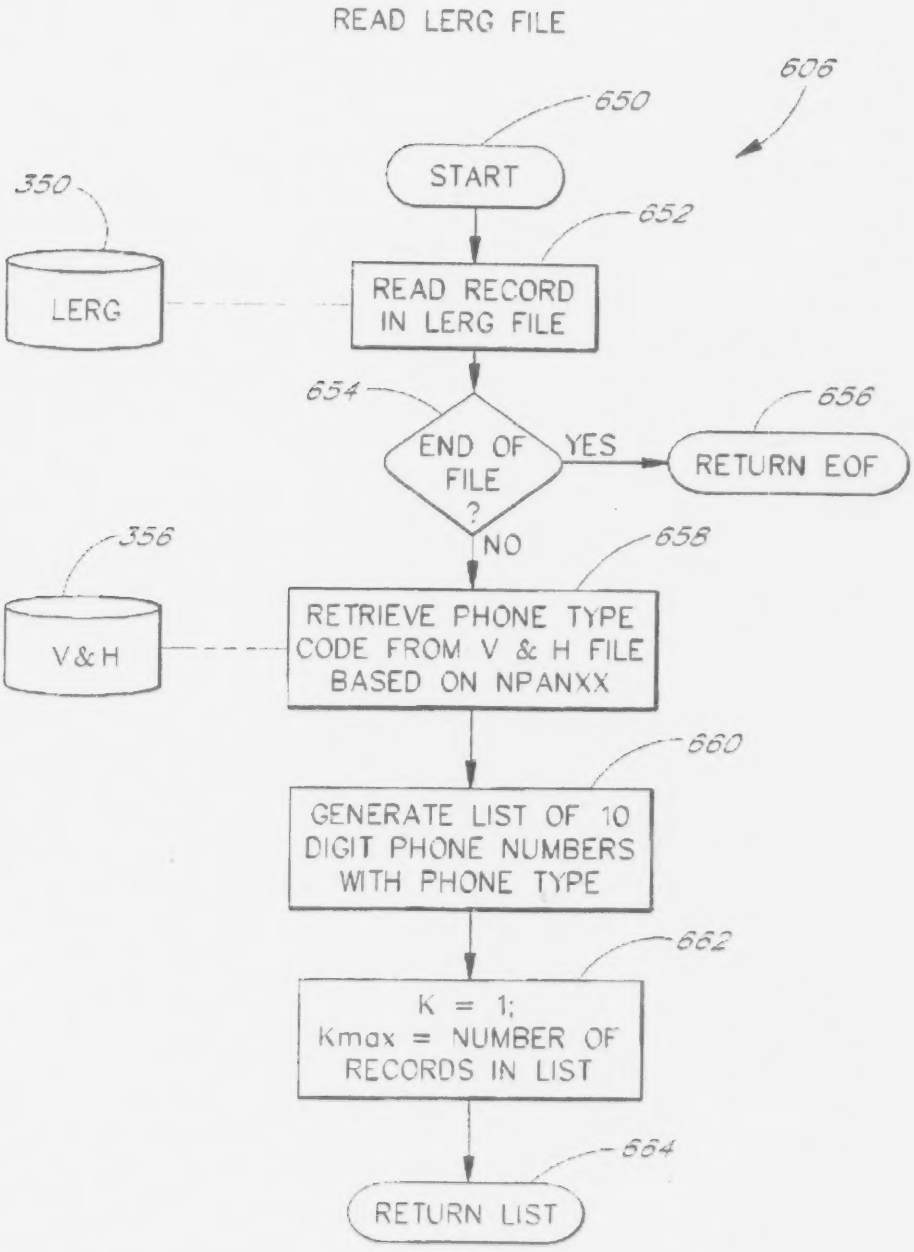

READ LERG FILE
606
650
START
652
READ RECORD IN LERG FILE
350
LERG
654
END OF FILE ?
YES
656
RETURN EOF
NO
356
V&H
658
RETRIEVE PHONE TYPE CODE FROM V & H FILE BASED ON NPANXX
660
GENERATE LIST OF 10 DIGIT PHONE NUMBERS WITH PHONE TYPE
662
K = 1;
Kmax = NUMBER OF RECORDS IN LIST
664
RETURN LIST

FIG. 13

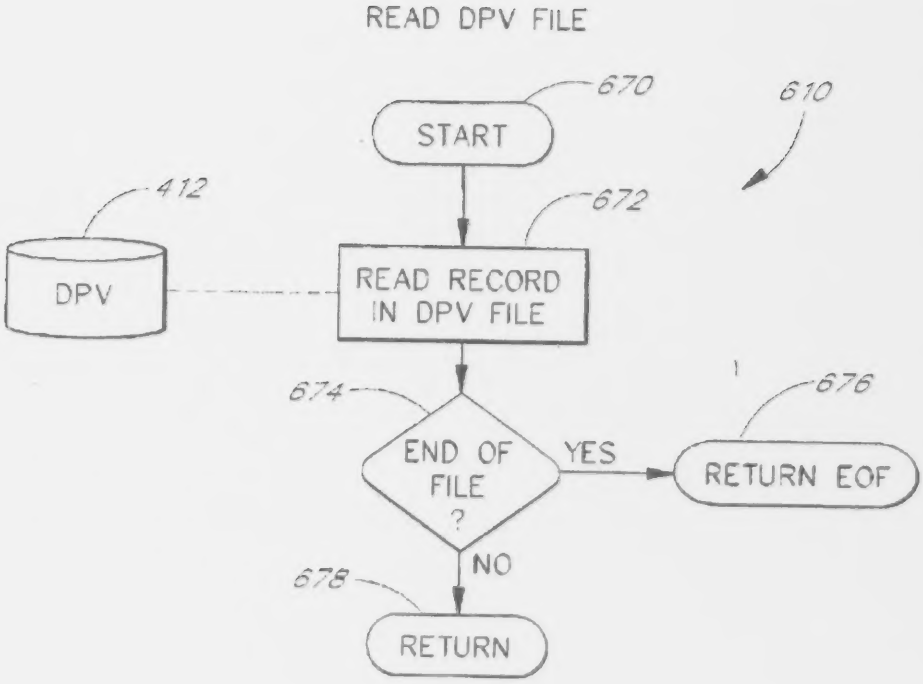

READ DPV FILE
670
610
START
412
672
DPV
READ RECORD IN DPV FILE
674
676
END OF FILE ?
YES
RETURN EOF
NO
678
RETURN

FIG. 14

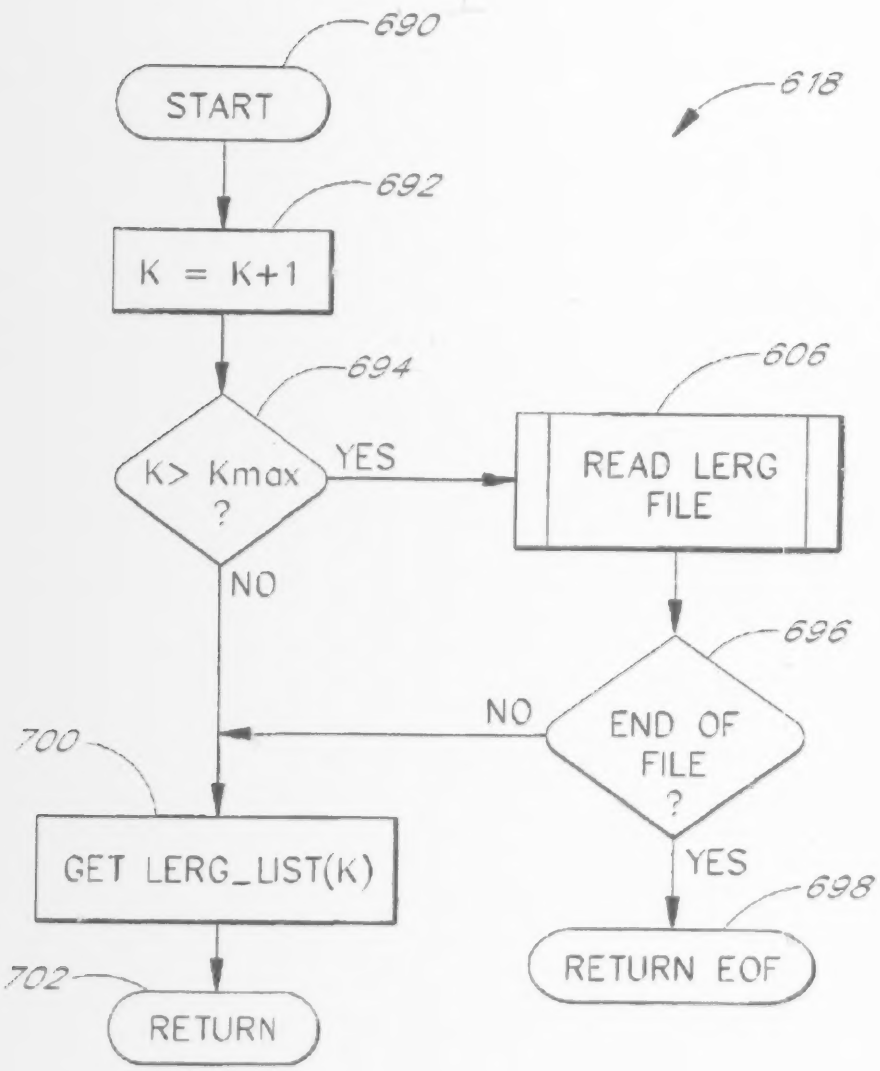

INCREMENT LERG LIST
690
START
618
692
K = K+1
694
606
K> Kmax ?
YES
READ LERG FILE
NO
696
NO
END OF FILE ?
700
GET LERG_LIST(K)
YES
698
RETURN EOF
702
RETURN

FIG. 15

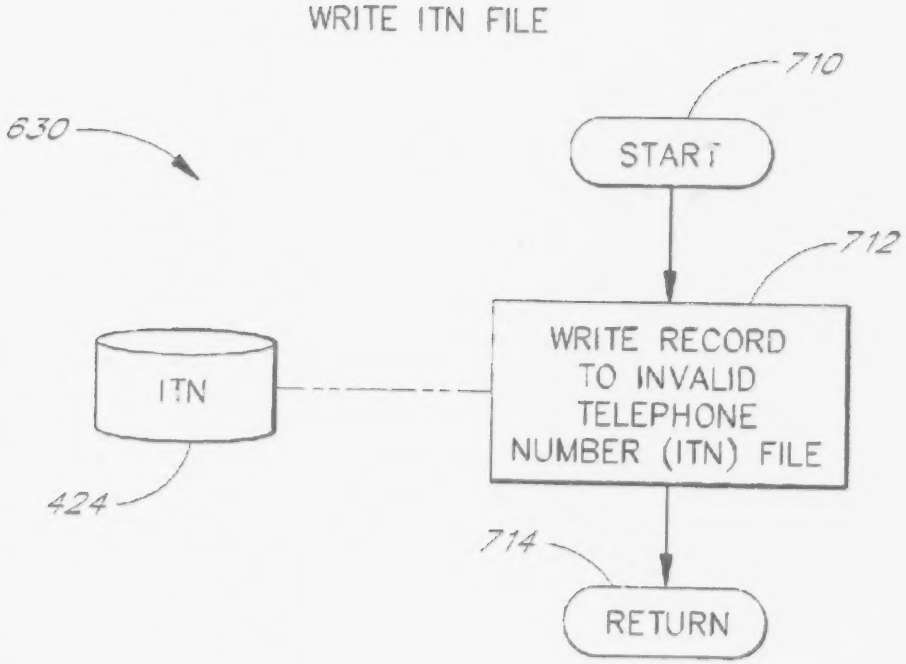

WRITE ITN FILE
630
710
START
712
WRITE RECORD TO INVALID TELEPHONE NUMBER (ITN) FILE
ITN
424
714
RETURN

FIG. 16

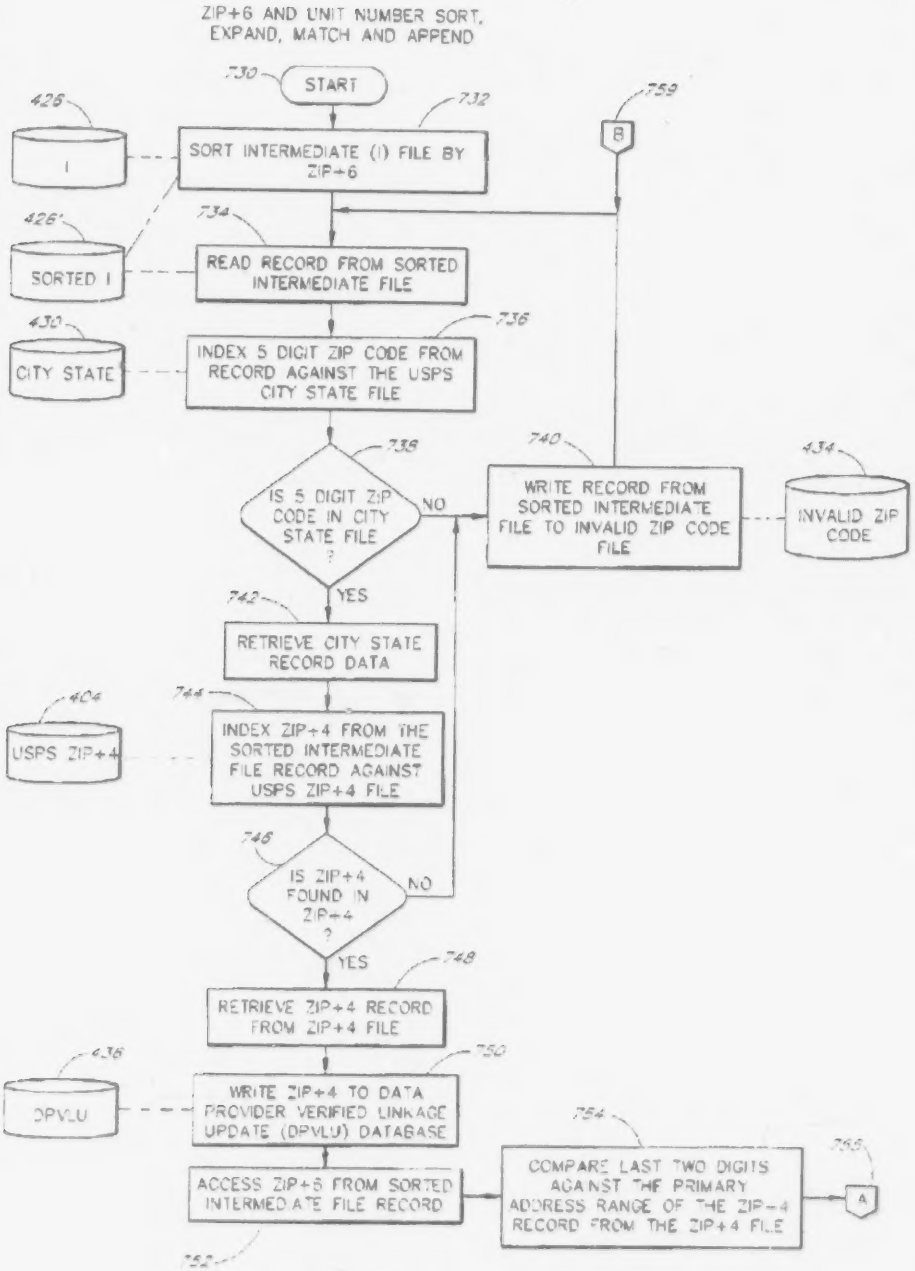

ZIP+6 AND UNIT NUMBER SORT, EXPAND, MATCH AND APPEND
730
START
426
I
732
SORT INTERMEDIATE (I) FILE BY ZIP+6
759
B
426'
SORTED I
734
READ RECORD FROM SORTED INTERMEDIATE FILE
430
CITY STATE
736
INDEX 5 DIGIT ZIP CODE FROM RECORD AGAINST THE USPS CITY STATE FILE
738
IS 5 DIGIT ZIP CODE IN CITY STATE FILE ?
NO
740
WRITE RECORD FROM SORTED INTERMEDIATE FILE TO INVALID ZIP CODE FILE
434
INVALID ZIP CODE
YES
742
RETRIEVE CITY STATE RECORD DATA
404
USPS ZIP+4
744
INDEX ZIP+4 FROM THE SORTED INTERMEDIATE FILE RECORD AGAINST USPS ZIP+4 FILE
746
IS ZIP+4 FOUND IN ZIP+4 ?
NO
YES
748
RETRIEVE ZIP+4 RECORD FROM ZIP+4 FILE
436
DPVLU
750
WRITE ZIP+4 TO DATA PROVIDER VERIFIED LINKAGE UPDATE (DPVLU) DATABASE
754
COMPARE LAST TWO DIGITS AGAINST THE PRIMARY ADDRESS RANGE OF THE ZIP+4 RECORD FROM THE ZIP+4 FILE
755
A
ACCESS ZIP+6 FROM SORTED INTERMEDIATE FILE RECORD
752

FIG. 17A

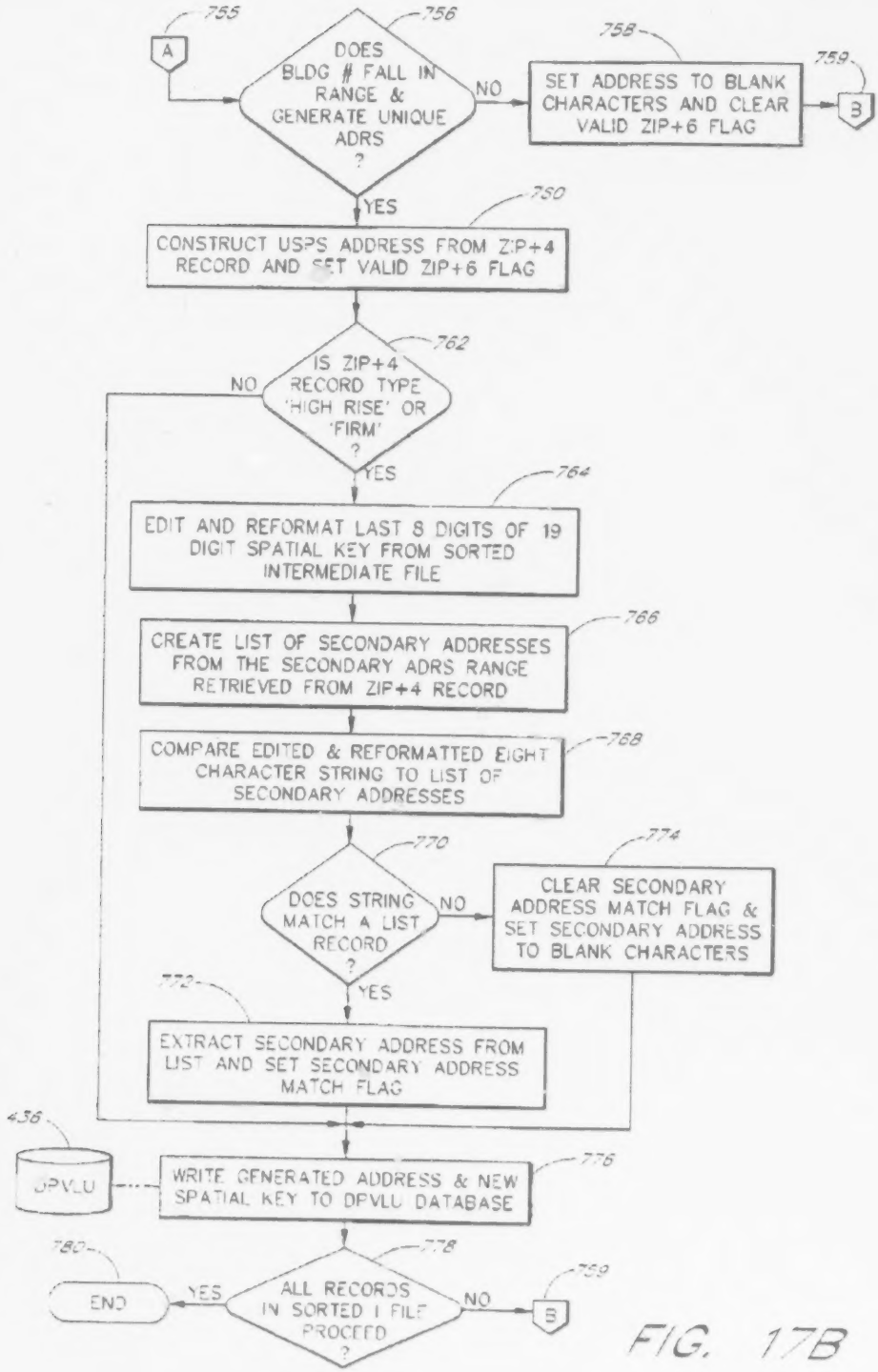

755
A
756
DOES BLDG # FALL IN RANGE & GENERATE UNIQUE ADRS ?
NO
758
SET ADDRESS TO BLANK CHARACTERS AND CLEAR VALID ZIP+6 FLAG
759
B
YES
760
CONSTRUCT USPS ADDRESS FROM ZIP+4 RECORD AND SET VALID ZIP+6 FLAG
762
IS ZIP+4 RECORD TYPE 'HIGH RISE' OR 'FIRM' ?
NO
YES
764
EDIT AND REFORMAT LAST 8 DIGITS OF 19 DIGIT SPATIAL KEY FROM SORTED INTERMEDIATE FILE
766
CREATE LIST OF SECONDARY ADDRESSES FROM THE SECONDARY ADRS RANGE RETRIEVED FROM ZIP+4 RECORD
768
COMPARE EDITED & REFORMATTED EIGHT CHARACTER STRING TO LIST OF SECONDARY ADDRESSES
770
DOES STRING MATCH A LIST RECORD ?
NO
774
CLEAR SECONDARY ADDRESS MATCH FLAG & SET SECONDARY ADDRESS TO BLANK CHARACTERS
YES
772
EXTRACT SECONDARY ADDRESS FROM LIST AND SET SECONDARY ADDRESS MATCH FLAG
436
DPVLU
776
WRITE GENERATED ADDRESS & NEW SPATIAL KEY TO DPVLU DATABASE
778
ALL RECORDS IN SORTED I FILE PROCEED ?
YES
780
END
NO
759
B

FIG. 17B

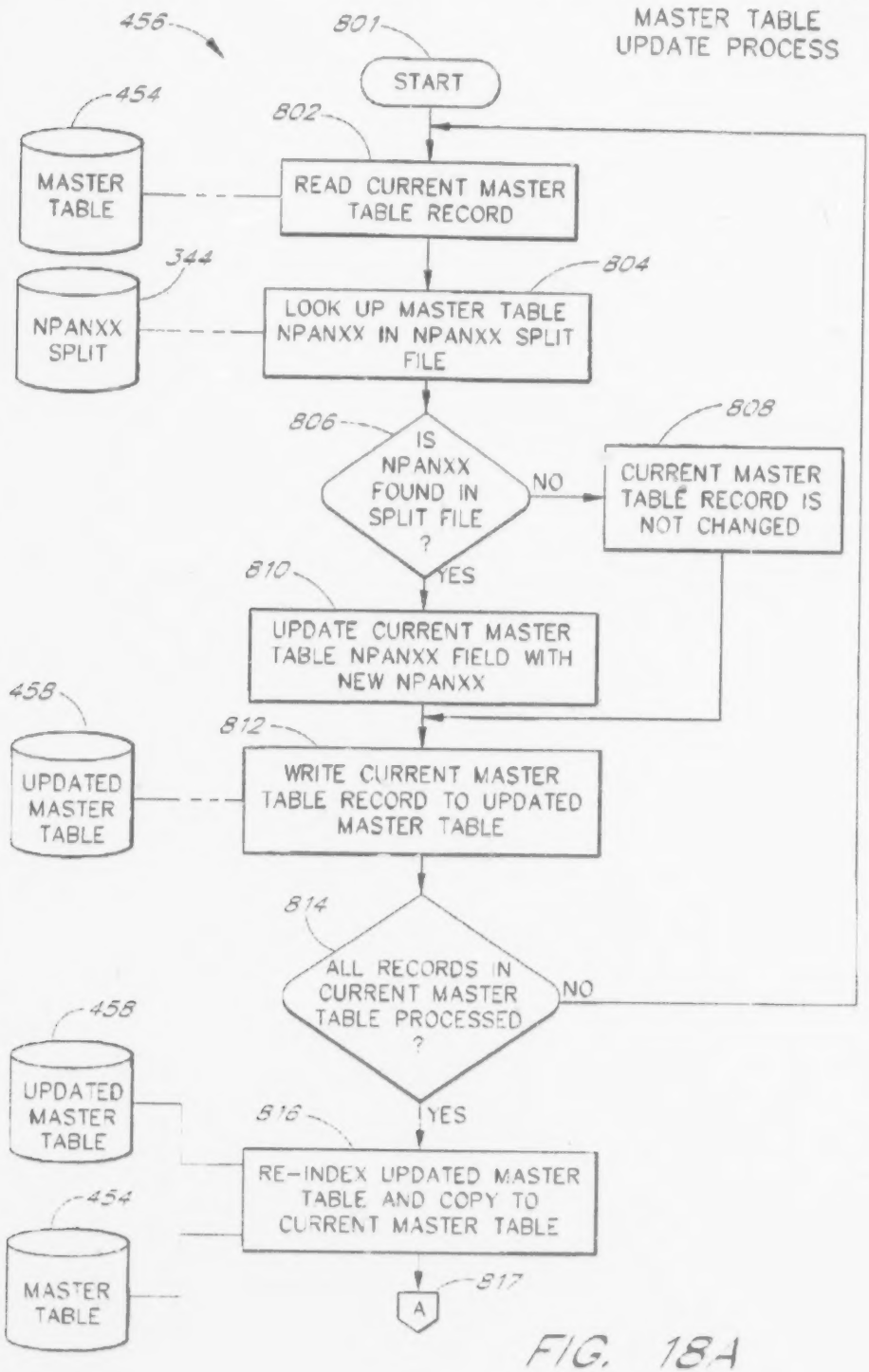

456
801
MASTER TABLE UPDATE PROCESS
START
454
MASTER TABLE
802
READ CURRENT MASTER TABLE RECORD
344
NPANXX SPLIT
804
LOOK UP MASTER TABLE NPANXX IN NPANXX SPLIT FILE
806
IS NPANXX FOUND IN SPLIT FILE ?
NO
808
CURRENT MASTER TABLE RECORD IS NOT CHANGED
YES
810
UPDATE CURRENT MASTER TABLE NPANXX FIELD WITH NEW NPANXX
458
812
UPDATED MASTER TABLE
WRITE CURRENT MASTER TABLE RECORD TO UPDATED MASTER TABLE
814
ALL RECORDS IN CURRENT MASTER TABLE PROCESSED ?
NO
458
YES
816
UPDATED MASTER TABLE
RE-INDEX UPDATED MASTER TABLE AND COPY TO CURRENT MASTER TABLE
454
MASTER TABLE
817
A

FIG. 18A

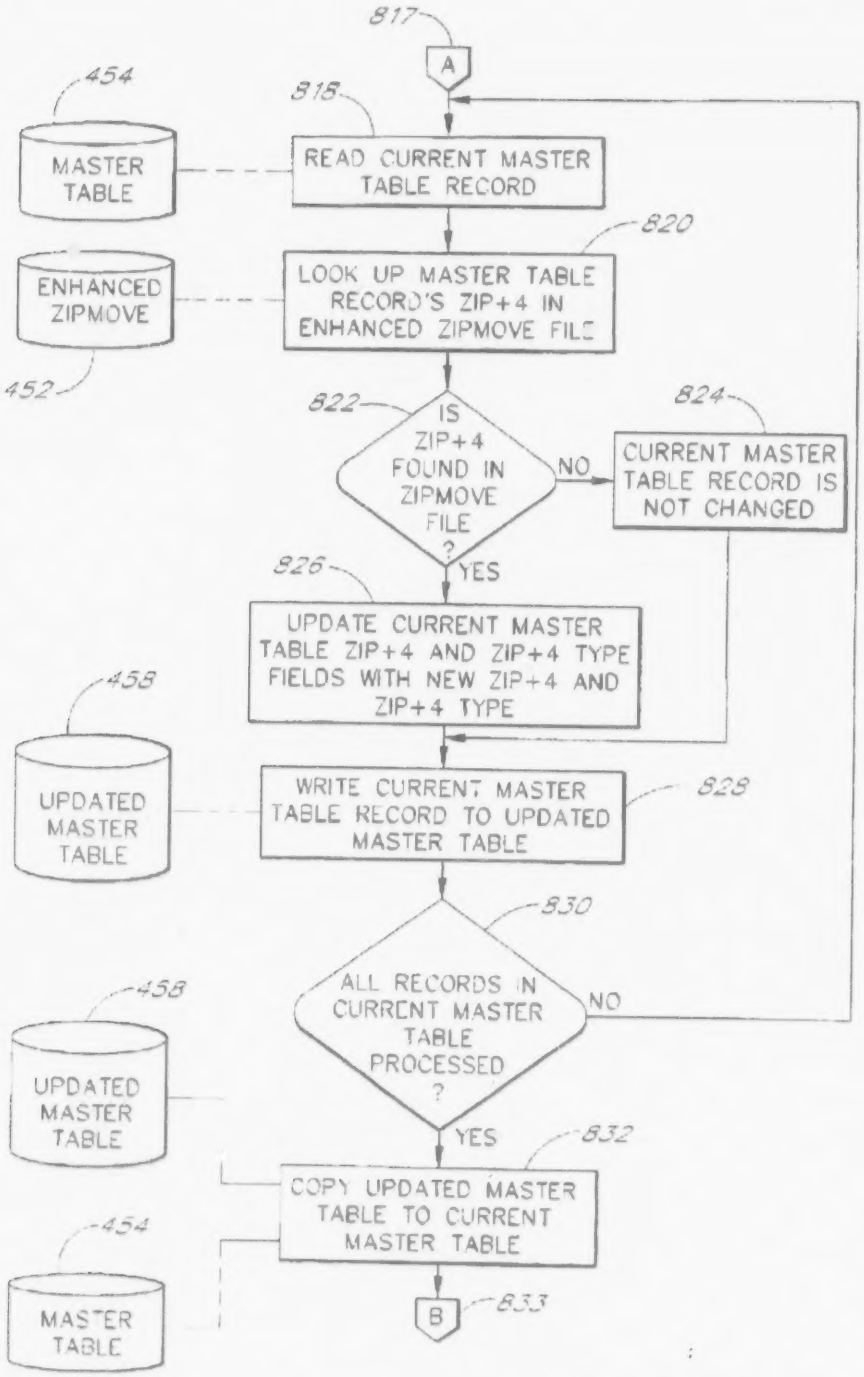

817
A
454
MASTER TABLE
818
READ CURRENT MASTER TABLE RECORD
820
ENHANCED ZIPMOVE
LOOK UP MASTER TABLE RECORD'S ZIP+4 IN ENHANCED ZIPMOVE FILE
452
822
IS ZIP+4 FOUND IN ZIPMOVE FILE ?
NO
824
CURRENT MASTER TABLE RECORD IS NOT CHANGED
YES
826
UPDATE CURRENT MASTER TABLE ZIP+4 AND ZIP+4 TYPE FIELDS WITH NEW ZIP+4 AND ZIP+4 TYPE
458
UPDATED MASTER TABLE
WRITE CURRENT MASTER TABLE RECORD TO UPDATED MASTER TABLE
828
830
ALL RECORDS IN CURRENT MASTER TABLE PROCESSED ?
NO
458
UPDATED MASTER TABLE
YES
832
COPY UPDATED MASTER TABLE TO CURRENT MASTER TABLE
454
MASTER TABLE
B
833

FIG. 18B

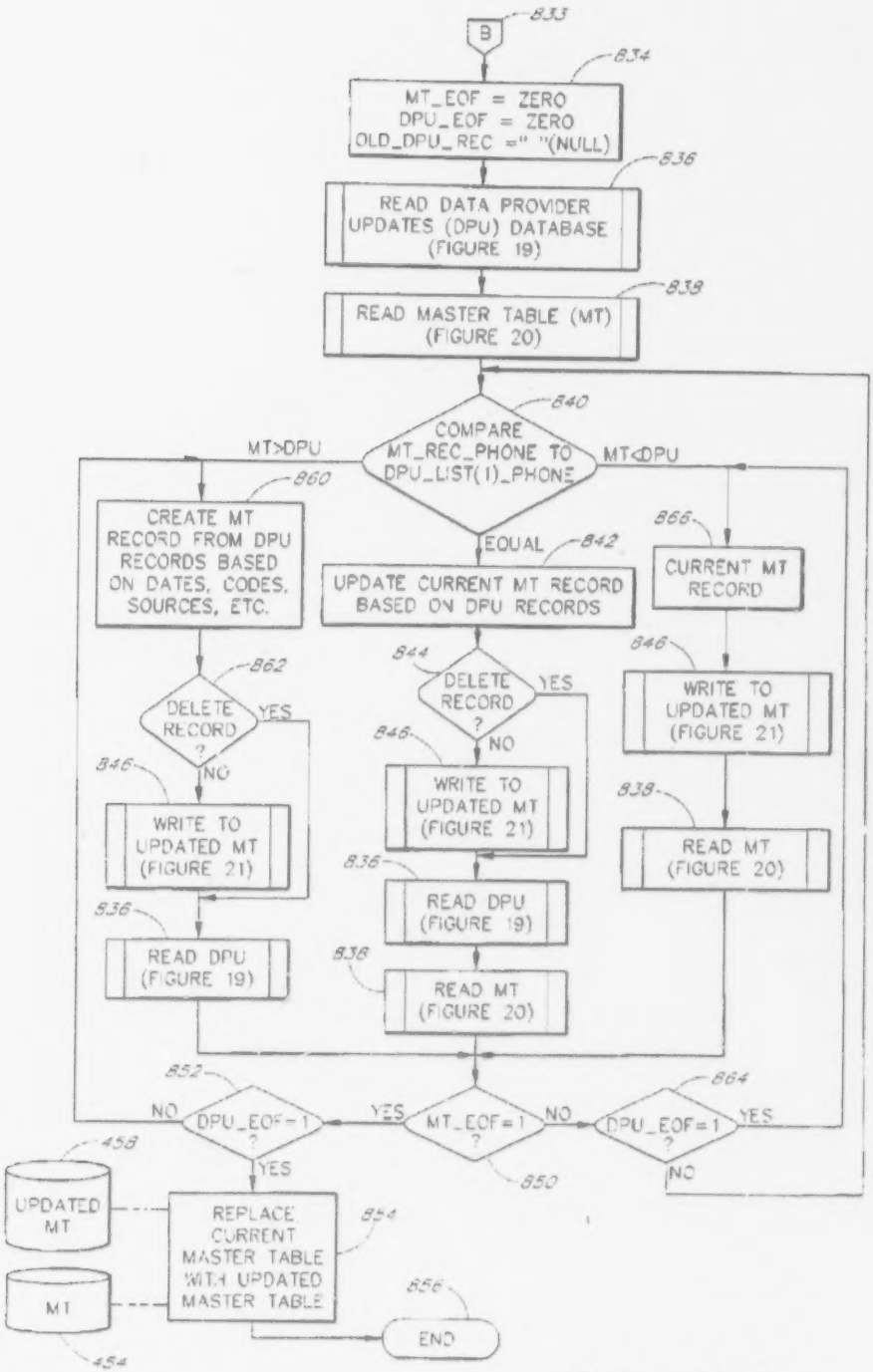

B
833
MT_EOF = ZERO
DPU_EOF = ZERO
OLD_DPU_REC =" "(NULL)
834
READ DATA PROVIDER UPDATES (DPU) DATABASE (FIGURE 19)
836
READ MASTER TABLE (MT) (FIGURE 20)
839
COMPARE MT_REC_PHONE TO DPU_LIST(I)_PHONE
840
MT>DPU
MT<DPU
EQUAL
842
CREATE MT RECORD FROM DPU RECORDS BASED ON DATES, CODES, SOURCES, ETC.
860
UPDATE CURRENT MT RECORD BASED ON DPU RECORDS
CURRENT MT RECORD
866
DELETE RECORD ?
862
844
YES
NO
WRITE TO UPDATED MT (FIGURE 21)
846
READ DPU (FIGURE 19)
836
READ MT (FIGURE 20)
838
DPU_EOF=1 ?
852
MT_EOF=1 ?
850
DPU_EOF=1 ?
864
UPDATED MT
458
MT
454
REPLACE CURRENT MASTER TABLE WITH UPDATED MASTER TABLE
854
END
856

FIG. 18C

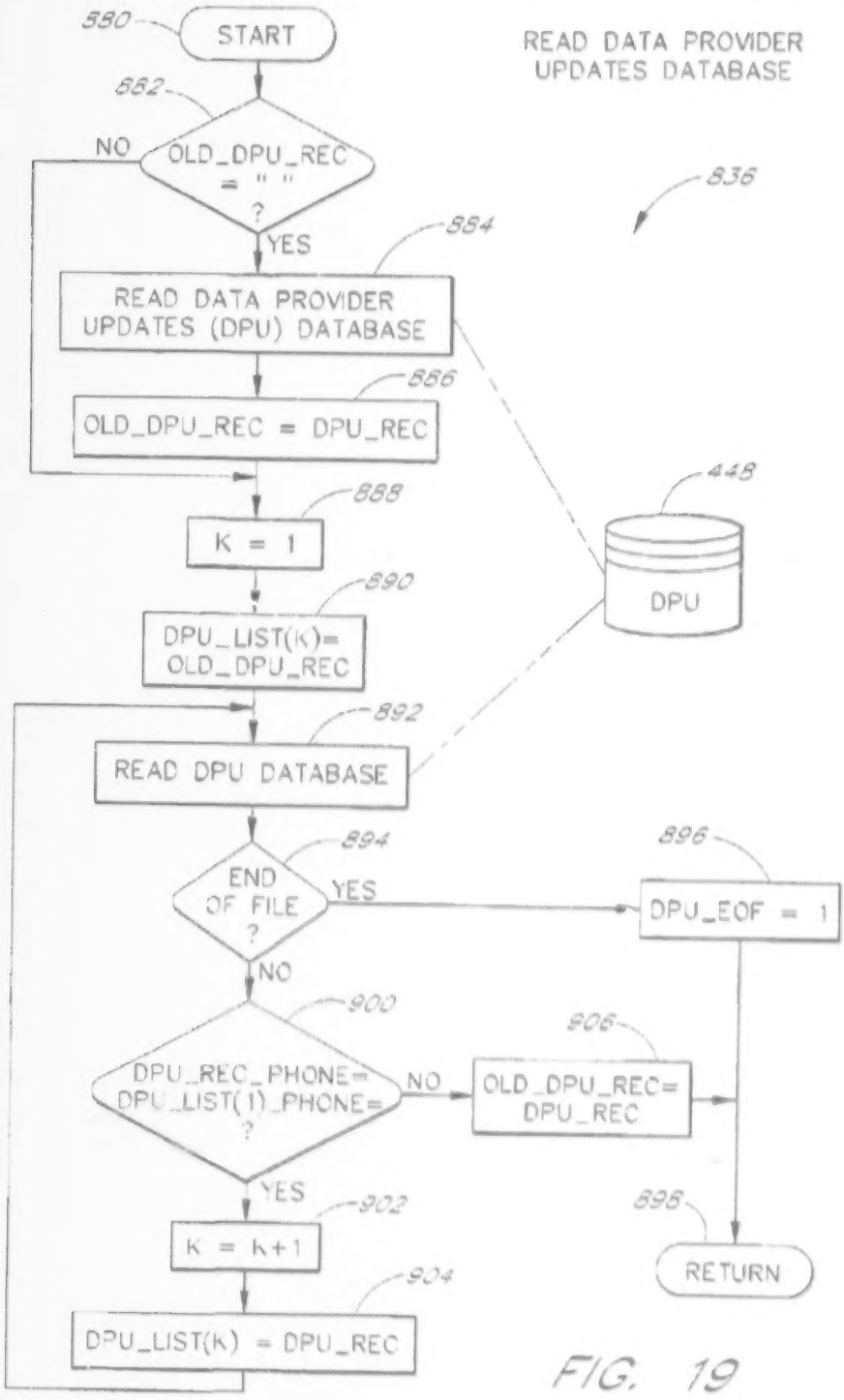

880
START
READ DATA PROVIDER UPDATES DATABASE
882
NO
OLD_DPU_REC = " "
?
YES
836
884
READ DATA PROVIDER UPDATES (DPU) DATABASE
886
OLD_DPU_REC = DPU_REC
448
888
K = 1
DPU
890
DPU_LIST(K)= OLD_DPU_REC
892
READ DPU DATABASE
894
END OF FILE
?
YES
896
DPU_EOF = 1
NO
900
DPU_REC_PHONE= DPU_LIST(1)_PHONE=
?
NO
906
OLD_DPU_REC= DPU_REC
YES
902
K = k+1
898
RETURN
904
DPU_LIST(K) = DPU_REC

FIG. 19

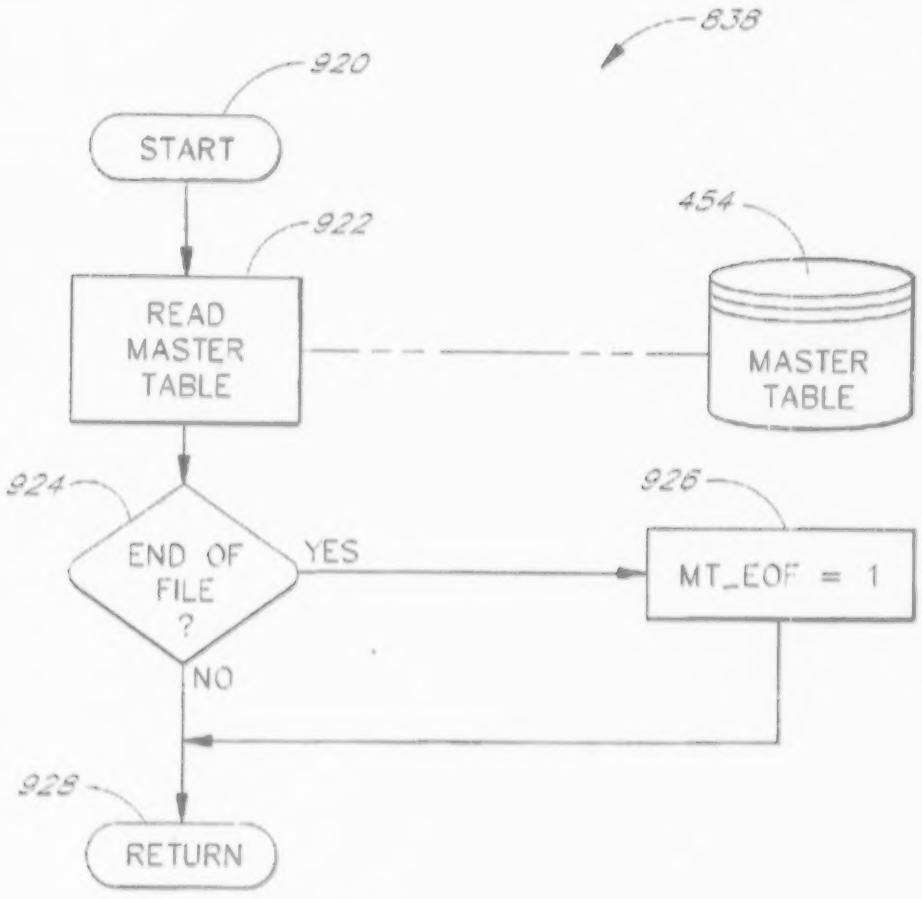

838
920
START
922
READ MASTER TABLE
454
MASTER TABLE
924
END OF FILE ?
YES
926
MT_EOF = 1
NO
928
RETURN

FIG. 20

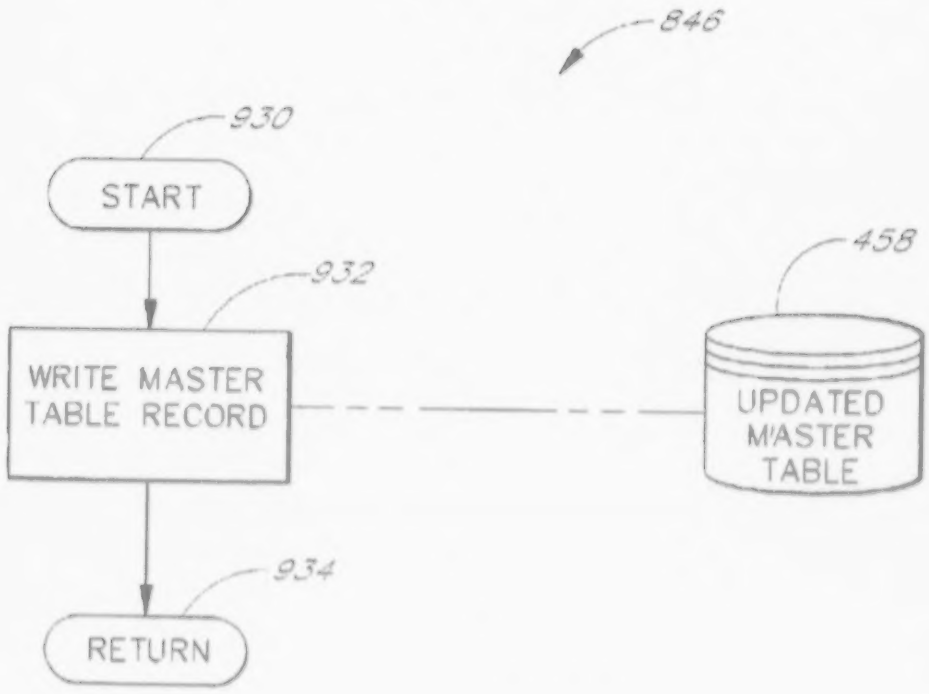

846
930
START
932
WRITE MASTER TABLE RECORD
458
UPDATED MASTER TABLE
934
RETURN

FIG. 21

ONE NUMBER INTELLIGENT CALL PROCESSING SYSTEM

RELATED APPLIATION

This application claims the benefit of U.S. Provisional Application No. 60/019,526, filed Jun. 10, 1996.

BACKGROUND OF THE INVENTION

1. Field of Invention

The present invention relates to telecommunications call processing. More specifically, it relates to processing of a vanity telephone number dialed by a caller with a conventional telephone, so as to access a national virtual telephone number database to provide benefits, such as improved connection efficiency, selected services or products, to the caller, the servicing location(s) associated with the vanity number dialed and/or the vanity number advertiser.

2. Description of the Related Technology

Traditionally, entities with multiple employees, departments and/or locations, such as businesses and government agencies, have provided their customers with multiple telephone number points of contact, with usually at least one telephone number for each employee, department and location. This has placed a major burden on customers and prospective customers to find, remember, dial and be connected to the correct intra-entity telephone number for the services desired. It also has created cost and administrative burdens on these entities to publish and advertise multiple telephone numbers.

In the new world of electronic commerce, many such entities have started advertising "one number", vanity telephone numbers as their primary customer contact point. These vanity numbers are usually national 10 digit numbers starting with area codes such as "800," "888," or "900", local 7 digit numbers starting with an exchange such as "555" and "950" or special purpose three digit numbers like "311", "411" or "911". These numbers are usually easy to remember, such as 1-800-FLORIST. Unlike regular telephone calls with only two participants, vanity telephone number calls can have three participants, recipients, or beneficiaries:

1. The Vanity Number Advertiser
2. The Caller or Consumer
3. The Servicing Location(s)

Based on the increased volume of calls to these vanity numbers and customer demands for 24 hour support during seven days a week, reduced telephone busy signals and shorter hold times, vanity number advertisers have begun answering these calls with a new technology called Voice Response Units (VRU), also known as Interactive Voice Response (IVR).

Currently, there are over 50 manufacturers of VRUs. The commercialization of the VRU and changes in advertising practices has also spawned large numbers of new VRU applications from product manufacturers. Products may be advertised by an infomercial showing an "800" number to call so that a consumer may obtain a list of nearby dealers and/or a product brochure. The 800 number is answered by a VRU which requests the caller to record their name and address. This partially automates the call process, but requires large amounts of disk storage to store the caller provided recorded voice information and creates a large amount of post call work for the advertiser. For example, the advertiser must listen to, understand, transcribe the caller's name and address, certify the address by use of a United States Postal Service (USPS) coding accuracy support system (CASS), manually compile a list of nearby dealers and mail the information packet to the caller's address. These inefficiencies have created a need to further automate VRU applications. This is accomplished through what is now called intelligent call processing technology.

In this context, automated intelligent call processing (ICP) is defined as the capture of network provided data, such as automatic number identification (ANI) and dialed number identification service (DNIS), and caller-provided data, such as data entered by Dual Tone Multi-Frequency (DTMF) through a Touchtone telephone key pad or the caller speaking through the telephone to a VRU. ICP also involves the VRU accessing external databases that can decipher, validate, process and fulfill the caller's request by playing pre-recorded messages, creating call specific messages and speaking them to the caller, storing call captured information that can be accessed by or forwarded to the caller, servicing location or vanity advertiser, and/or automatically routing and connecting the caller to the servicing location or department. Semi-automated intelligent call processing is characterized by automating components of the call through intelligent call processing, but having some portion of the request still requiring live operator support during the call.

There are three primary components to an intelligent call processing system:

- the network: the system level hardware and software that provides the platform for intra- and inter-system and participant communications;
- the information retrieval, processing and storage: the databases and processing algorithms that provide the network application with the information required to fulfill the request; and
- the applications: the processes that process and fulfill the request(s) of the caller, the servicing location and/or the vanity advertiser by utilizing the network and the retrieved, processed and stored information.

THE NETWORK

The VRU is the device that can be used to replace the network operator and/or the answering party. Early primitive, non-integrated ancestors to the VRU are the caller ID box and the answering machine. Current state-of-the-art VRUs are programmable devices that not only capture and process network provided data but also accurately translate caller spoken numbers and words into textual or binary data, and convert digital text in the form of words and sentences into speech that is understandable by most callers. The VRU capabilities in these areas are continuing to rapidly improve. The last remaining obstacle to VRU automation is immediate access to more information. This required better network access to network and remote databases and a way to associate the digital data stored in these databases with network provided data, such as ANI and DNIS, and caller provided telephone input in the form of sound: voice or DTMF accurately translated into digital data.

The computer network portion of this problem has been addressed with faster 32 bit and 64 bit processors, vast amounts of cheap RAM and disk storage, new levels of Computer Telephone Integration (CTI) and advances in computer wide area networking that provides real time access to many different databases stored on different computer systems physically located in different parts of the country. This is demonstrated in part by a variety of consumer computer-interface applications supported by com-

puter network services, such as CompuServe®, America Online®, Microsoft Network™ and the Internet.

There are nearly 200 million access points in the national telephone network, which is many times the current number of access points for all of the computer networks combined. The major limitation of the telecommunications voice network is that other than the limited amount of network provided data and voice, the only widely supported communications means is another form of sound, i.e., DTMF, which is a very primitive way of achieving one-way communication. Voice recognition has improved tremendously over the last few years, but is still a long way from being able to translate the words spoken by millions of people with different voices and accents into digital text words with 100% accuracy.

A few access points have videophones that support both sound and video in both send and receive modes. The technology has been around for many years to convert digital text data into video, and digital raster data in the form of maps and pictures into video, and transmit it over the national telecommunications network. There is also primitive technology available to scan and translate video images in the form of hand-written messages and typed characters, words and sentences into digital data, such as the ASCII character set. Today, none of the VRU manufacturers provide either of these capabilities with their current products. As videophones become more common in use, the existing technology to translate digital data into the form of a video image and transmit it to the caller will likely become a standard feature in all next generation VRUs.

A few access points also have computers with modems, speakers, microphones and telephone emulation software, such as Microsoft Phone. There is potential to have the computer translate on-screen typed text into DTMF tones using a more robust DTMF coding scheme and to have this translated back into digital text at the VRU. However, current VRUs do not have this capability.

INFORMATION RETRIEVAL, PROCESSING AND STORAGE

Currently, VRUs have no caller-friendly capability to accurately translate caller voice or DTMF input into complex digital database access keys. Consequently, VRU database access has been limited to databases indexed by a simple numeric key. These include pre-recorded messages and internal client customer databases indexed by customer ID. The ID is usually in the form of a telephone number, account number, policy number, order number or other numeric data that is provided by the network, can be entered by DTMF, or accurately translated into digital data by a VRU using current voice recognition technology. This method works for applications with existing customers who know their customer ID. However, for new customers, new businesses or new applications that service different target markets, these internal databases are either too sparse in coverage or do not contain the required information.

On the other hand, there are many frequently updated national databases that have not been accessible by VRUs using network provided data or caller provided telephone input. These include:

- The USPS address coding guide.
- The US Census Bureau's TIGER (Topographical Integrated Geographic Encoded Record) and 1990 census data files.
- Geographic and spatial files from Geographic Data Technology, Inc. (GDT) and ETAK®, such as ZIP+4 to latitude and longitude, ZIP+4 to census block, ZIP Code and census boundary, and enhanced TIGER files.
- Household and individual databases from Polk, First Data Resources (FDR), Metromail and the big three credit bureaus: Equifax, Trans Union and TRW.
- Property databases from TransAmerica, TRW Ready Data and ACXIOM DATAQUICK.
- Updated census data files and geodemographic databases from Claritas, Equifax National Decision Systems, Urban Decision Systems (UDS), CACI and Strategic Mapping, Inc. (SMI).
- Business and government location databases from American Business Information® (ABI), DUNS, ProCD and Database American.
- Business financial databases from DUNS and TRW.
- Hundreds of private company, state and local government and regional files of various types.

All the above databases have one or more of the following limitations that has previously restricted them from being used in VRU applications:

- They do not contain a telephone number field.
- They contain a telephone number field but a high percentage of records have missing telephone numbers, have out of date telephone numbers or have a very limited amount of data associated with the telephone number.
- They do not share a common access key that the caller knows, is willing to provide and can easily communicate to a VRU.

The missing link in making all the above data available in real-time to VRU applications is creating a standardized, precise and universal database linkage key that can be assigned to all the United States telephone numbers and all of the above mentioned databases. This key needs to act as a direct and/or translator linkage mechanism between the telephone number and databases for spatial, geographic, USPS address, household, individual, business location, government location, business financial, property and client service locations with service areas of any defined geographic size and shape. Since the most common trait shared among the above mentioned databases is their geographic/spatial location, definition and/or relationship, the most logical solution would be a universal hierarchical geographic/spatial linkage key, "Spatial Key". Utilizing the Spatial Key to create a virtual telephone number database would make it practical to automate many VRU applications that provide the caller with information, connect the caller with a servicing location and/or capture or retrieve caller related information to assist the vanity advertiser and/or the servicing location in providing better during call and post-call service to the caller.

Applicant is not aware of any product or method that uses a single key to create a virtual telephone number database by linking to many different and seemingly unrelated databases for supporting multiple applications. Savage et al. (U.S. Pat. No. 4,954,958) associates the 10-digit telephone number with an address-indexed street network database to provide directions over a telecommunications network to a caller. Savage uses two 10 digit telephone numbers input by the caller to provide directions from point A corresponding to the location of the first telephone number to point B corresponding to the location of the second telephone number.

As a telephone number to address translation mechanism, the Savage system uses the American Business [illegible] (ABI) file which is compiled from the national yellow pages. The ABI file contains approximately 10 million unique business

telephone numbers and was originally created for use as a direct marketing database and a national business directory assistance database. The Savage system indexes each 10-digit telephone number into the ABL File to retrieve a business name and a raw address for each end point. In the telecommunications and direct marketing industries, this well-known process of starting with a phone number and looking up a name and address from a directory database is called a reverse directory search. The Savage system uses the raw addresses retrieved by this process as a linkage mechanism to what is referred to as a geodata digitized mapping database from MapInfo®. The source of the MapInfo database most likely is the Census Bureau Geographic Base File-Dual Independent Measurement Encoded (GBF-DIME), which is the predecessor to the TIGER files.

There are many technical issues associated with using a raw, non-standardized and free-formatted address which is composed of a street number, street pre-direction, street name, street type, street post-direction, city name and state as a linkage means between two databases compiled from different sources. These issues include: field size, address formatting and parsing, upper case and lower case, abbreviations, alternate names, alternate spellings (First vs. 1st), missing components and the source of city name. For example, Highway 101, PC HWY, PCH, Pacific Coast Hwy, First Street and 1st St. are all valid alternate street names and types for 1st St. in Encinitas, Calif. This large number of address permutations requires very sophisticated address parsing, standardizing, sorting, matching and scoring algorithms to correctly match raw addresses from two independent databases.

The Savage system does not address the above issues in matching the two raw ABL retrieved addresses to their corresponding two raw addresses on the preferred MapInfo digitized mapping database. The Savage description of the address matching embodiment is: "the central processor will retrieve from the geodata digitized mapping database the routing data correlated to the geographic location addresses". What is needed is a simple, accurate and definable way (such as a Spatial Key) to precisely hierarchically code the address associated with a telephone number and use it as a hierarchical match key to retrieve matching data from other databases coded with all or part of the same hierarchical match key.

In addition, the Savage system does not provide any automated means to determine a servicing location nearby the caller. The caller must know and input the telephone number of the desired service location to get directions. This also eliminates the possibility of providing directions to service locations, such as drop boxes and automatic teller machines (ATMs) that do not have telephones.

Riskin (U.S. Pat. No. 4,757,267) uses the first six digits of the caller's telephone number to select a nearby serving location by performing an on-the-fly calculation to determine the nearness relationship. However, none of the databases mentioned above are accessible by Riskin's process because the first six digits of the telephone number do not provide enough precision to identify the housing or business unit location of the caller.

There are also two previous systems that use a client-specific Caller Telephone Number To a Service Location Telephone Number table as a means of connecting a caller to a servicing location. Cotter (U.S. Pat. No. 4,797,818) describes a manually intensive process for building and maintaining this table. Wegrzynowicz (U.S. Pat. No. 5,136,636) only references the table as a system component that is built and maintained by the client, but does not describe how the client performs this function.

Neither Savage, Riskin, Cotter, nor Wegrzynowicz use a linkage process similar to the Spatial Key. Further, none of the prior systems mention using a single linkage mechanism as a means to link to multiple databases to support multiple applications.

Developing a Spatial Key

In developing a universal Spatial Key the following must be considered:

1. The stability and updateability of the key over time.
2. The ability of the key to be a unique housing, business and/or postal delivery unit identifier.
3. The geographic hierarchy and precision of the key.
4. The number and quality of updated commercial and public translation tables to and from the key.
5. The availability of tools for third parties to place the key on their files.
6. The ability to precisely associate the key to service locations with service areas of any geographic defined size and shape.
7. The ability of regulated telecommunications entities to code their files with the key and to pass the key outside the regulated portion of the network.

Based on the above considerations, there are four primary candidates for the key:

1. Most recent census block code
2. Latitude and Longitude
3. Telephone Number
4. USPS ZIP Code

The other candidates, such as a voting precinct, are eliminated from discussion because of a lack of precision.

Most Recent Census Block Code

The Census block code is a hierarchical 15-digit Federal Information Processing Standard (FIPS) number that is updated once every 10 years in conjunction with the United States decennial census. It has the following seven level hierarchy:

2 digit state code
3 digit county code
4 digit tract code
2 digit tract suffix
1 digit block group code
2 digit block code
1 character block part code

The critical limitation of using census block as the Spatial Key is it is not precise enough to act as a unique housing or business unit identifier.

Latitude and Longitude

Latitude and longitude are used in a spherical coordinate system to identify a point on the earth. Its stability in the United States is a function of the North American Datum (NAD) which was originally established by the United States Geological Survey (USGS) in 1927 and was updated in 1983. To use the latitude and longitude as a hierarchical key, the base 10 or binary digits of the latitude and longitude pair must be interleaved to form a single number. The result of this interleaving is generally referred to as a quadtree. Alternatively, the latitude and longitude pair may be combined and/or translated to form another identifier. When latitude and longitude are stored in millionths of degrees, the

interleaving creates a nine level base 10 and a sixteen level binary hierarchical system with a mathematical precision of approximately plus or minus 4 inches.

This level of precision is supported by the US Department of Defense's implementation of Global Positioning Satellites (GPS) technology. However, the two primary commercial means by which latitudes and longitudes are assigned to a location, i.e., the TIGER files (NAD27) and commercial level GPS (NAD83), do not support this level of precision. For locations in California, the latitude and longitude coordinates vary by as much as 300 feet between NAD27 and NAD83. There is a mathematical relationship between NAD27 and NAD83, such that latitudes and longitudes can be converted back and forth.

In addition to the above precision issues, latitude and longitude would not make a good choice for a unique housing or business identifier because multi-story buildings require a third coordinate, i.e., elevation. Another limitation with latitude and longitude as a Spatial Key is it requires very specialized Geographic Information System (GIS) databases and knowledge to Spatial Key code. However, commercial level latitude and longitude has no equal when input into a GIS system using data from a single NAD that is indexed by quadtree in showing a relative location on a map with precision in the 30 to 100 foot range.

Telephone Number

The 10 digit telephone number appears to comprise a three level hierarchical system.

3 digit Numbering Plan Area (NPA) or area code

3 digit NXX, exchange or prefix

4 digit line number or suffix

Currently, NPAs do not spatially overlap and, with two minor exceptions, do not cross state boundaries. However, there are current plans to create spatially overlapping NPAs in the future. This will require callers in these NPAs to always dial 10 digits. The next non-spatially overlapping level is not the NXX, but the central office (CO) or wire center (WC). Each CO supports one to a few NXXs. Usually over time, the line numbers associated with a NXX become randomly distributed across the locations of the households and businesses serviced by the CO. There are also NXXs, such as 555, 950 and those assigned to cellular phones and pagers, that have no specific geographic boundaries within the NPA. There are also non-spatial NPAs such as 800, 888 and 900. These above items could cause difficulties in an intelligent call processing system if the telephone number was used as the Spatial Key.

There are several additional deficiencies in using the telephone number as the Spatial Key. These include, for example, the situation of using the telephone number as a unique housing or business unit ID. However, there would be multiple IDs for housing units and businesses with multiple telephone numbers. This would lead to excessive complexity in the system due to the multiple IDs. The main negatives associated with using the telephone number as the Spatial Key are the difficulty of accurately coding other databases with a telephone number and the regulatory issues related to transporting telephone numbers obtained from regulated sources outside the regulated telecommunications network.

USPS ZIP Code

The ZIP Code at the 11 digit level is called the Delivery Point Code (DPC) or ZIP+6 and uniquely identifies an individual building, such as 123 N Main St. The DPC is the most precise geographic code presently supported by the USPS and can be used as a unique housing or business unit identifier for single unit structures. However, it cannot uniquely identify a housing or business unit in multiple unit buildings or firms.

The DPC is a geographic hierarchical numbering system of five levels defined as follows:

3 digit ZIP Code is called a Sectional Center.

5 digit ZIP Code is called a Post Office Service Area with a preferred USPS name called the last line name. This is the name shown on the last line of a mailing address. There are 3 special types of ZIP Codes. Two of these, "Fleet Post Office (FPO)/Armed Forces Post Office (APO)" and "PO Box only", do not have precise spatial definitions, but can be linked to unique household equivalent mailing addresses.

7 digit ZIP Code identifies a geographic sector within a Post Office Service Area.

9 digit ZIP Code is called a ZIP+4 and is usually the geographic area of one side of a street within a single one hundred address range block. It is a unique household level identifier for most USPS' PO Box and RR addresses which usually do not have precise spatial definitions.

11 digit ZIP Code is called the Delivery Point Code or ZIP+6 and uniquely identifies a street number address, such as 123 N Main St. The street address is the most common USPS address and is a unique housing or business unit identifier for all single unit buildings with unique street addresses.

APPLICATIONS

Historically, many high-demand telephone call processing applications have not been commercialized because of one or more technical or economic issues including: automated caller interface technology, integrating telephone and computer networks, and telephone number database validation, coverage, depth and linkages.

In addition, when the above issues are addressed, all known previous efforts in the technology have focused on a custom solution to a specific application, and not on an integrated system solution that meets multiple application needs and the needs of the caller, servicing location and/or vanity number advertiser.

Automated Applications

The following is a partial list of automated application examples that have not either been addressed by previous art or addressed with a highly customized individual solution. It would be desired for all these applications to be automated using a common architecture in which the caller dials a vanity number and the system captures the caller's 10 digit ANI and DNIS. The architecture would only require the caller to respond to application dependent system voice prompts and/or only input a telephone number, if a telephone number different from the ANI is required by the application.

Connecting a caller to a servicing location: The prior technology does not support service locations having service areas of any size and shape, nor situations where geographic precision is required. A solution is desired that provides these abilities in an integrated common architecture.

USPS address retrieval. This is presently addressed by having the caller record their name and address, which

is later listened to by a person and transcribed. The transcribed address is then processed through CASS certified software for use in an existing customer database of addresses indexed by telephone number. What is desired is a way to use a caller provided telephone number to directly retrieve the CASS certified USPS address associated with the caller provided telephone number and, in applications requiring 100% accuracy, providing the caller a means to verify the retrieved address. In addition, in a post call process, the retrieved, verified and stored address and additional linked data is desired to be used by the vanity advertiser to mail to the caller, for example, a requested store coupon, menu, catalog or informational packet.

The VRU speaks the service location(s) name, address and/or micro directions (to the caller): Service location information is needed by the caller to mail, pickup and/or drop off something to a selected servicing location. The greatest need for micro-area directions to service location(s) is with service locations very small in size, such as Federal Express, UPS and USPS drop boxes, or ATMs located in large physical entities, such as shopping centers or multi-story buildings. A solution is desired that provides these abilities in an integrated common architecture.

The VRU speaks driveable street directions from the caller's location to the selected service location (to the caller). In addition, in a call parallel application, after transferring the call to the servicing location, the application retrieves the service location's FAX number from a Service Location Table and faxes to the service location the caller's telephone number, address and a map and/or directions from the service location to the caller location to assist the servicing location with delivery to caller. The Savage reference describes a application that requires the caller to input two telephone numbers, and the only benefactor to the Savage device is the caller. What is desired is a system that does not require the input of any telephone numbers, or at worst, only one telephone number is provided by the caller. In addition, services would be provided to the caller, servicing location and/or the vanity advertiser.

Eliminating servicing locations based on days and hours of operation and/or services offered: A solution is desired that provides these abilities in an integrated common architecture.

Caller profiling based on Census or geodemographic data: A system is desired, based on a caller's geodemographic code and product consumption rates, to only present product options to the caller that the caller is most likely to buy, or to route the call to an appropriate sales specialist based on the caller's profile.

Applications that require the caller's name and/or individual data such as product registration and insurance, loan or credit applications: What is desired is a way of linking a Spatial Key to a household database containing data, such as name of head of household, street address, number of children in the household and the names of other individuals living in or associated with the household. The system would speak these individual names and the caller would identify himself or herself. Then the system would link to individual data, such as date of birth, credit rating, and so forth, and provide it to the caller, servicing location, and/or vanity advertiser.

Business Location Data Retrieval: What is desired is a way of linking the caller's Spatial Key to a business database containing data, such as name of Business, SIC, Number of employees and DUNS number, which would link directly into the DUNS database for credit information.

Real Property Database Retrieval: What is desired is a way for a contractor, for example, before bidding on a job, to dial a vanity number that interfaces with an automated property database, enter the telephone number of the supposed residential property owner and verify the ownership, address, mortgage holder, and any outstanding liens on the property.

Semi Automated Applications

There are telephone call processing applications where operator decisions and/or assistance are required that can also benefit from a virtual telephone number database. The following are desired exemplary applications:

Address Lookup and verification by an operator taking a telephone order: In current telephone order systems, an operator key enters a customer's address and verifies the spelling with the caller. What is desired is a way for the caller's telephone number to be passed to the computer system to automatically retrieve the CASS certified address associated with the caller's telephone number and display it on the operator's visual display. The operator would then ask the caller for the address to which they want the order shipped. If the addresses match, the operator would not have to key enter it and verify the spelling with the caller. If the addresses are different, there is a high potential that the caller is trying to make a fraudulent order and the operator would ask additional questions required to make this determination.

Real Time Address to Spatial Key Coding and Spatial Key to Client Table with Off-Line Master Table update: What is desired is a way of continually updating a Master Table (Phone Number to Spatial Key table) that supports multiple clients and applications in the situation when a caller is trying to be connected to a servicing location and has provided a valid telephone number that is not in the Master Table.

"911" application: In a real time Public Health and Safety application, the caller places an emergency call to the emergency telephone number "911." The "911" application costs the U.S. taxpayer several billion dollars each year, and is currently overloaded with non-emergency calls. What is needed is a more economical alternative system for non-emergency "911" calls that can alleviate the load from the current overworked system.

A system and method that uses a single Spatial Key to create a virtual telephone number database by linking a caller's or caller provided telephone number to many different and seemingly unrelated databases for supporting multiple applications would be an advance in the industry. What is needed is an automated means to determine a servicing location nearby the caller, such that the caller does not need to know and input the telephone number of the desired service location to get directions or other desired information. This would facilitate providing directions to service locations, such as drop boxes and automatic teller machines (ATMs) that do not have telephones. Such a system would utilize all ten digits of the telephone number to provide enough precision to identify the housing or business unit location of the caller telephone number. What is desired is the integration of VRU technology with a CTI

network and a virtual telephone number database to provides a way to support a host of applications that were not previously possible. Information benefits derived by the caller, the servicing location and the vanity advertiser would be made possible by retrieving information from a virtual telephone number database created through Spatial Key linkage technology. Thus, a single linkage mechanism as a way to link to multiple databases to support multiple applications is needed. A solution is desired that provides these abilities in an integrated common architecture.

SUMMARY OF INVENTION

The call processing applications examples illustrated above and additional similar applications are satisfied by the present invention that includes a telephone call processing system and method in a CTI network. The present invention also includes a process for building and maintaining a Master Telephone Number to Spatial Key Table for use in a CTI network. A significant factor in this invention is the selection of a Spatial Key type. Several candidates including the Most Recent Census Block Code, Latitude and Longitude, Telephone Number, and USPS ZIP Code may be considered. Each Spatial Key type candidate has strengths and weaknesses. The extended ZIP code has been selected as the preferred embodiment for use in this invention as described below.

SELECTING A SPATIAL KEY

Extended Zip Code

The Delivery Point Code (DPC) or ZIP+6 is the most precise geographic code presently supported by the USPS and can be used as a unique housing or business unit identifier for single unit structures. However, it cannot uniquely identify a housing or business unit in multiple unit buildings or firms. To solve this problem, it is necessary to further subdivide the DPC using the USPS secondary address, such as apartment 2B, to create a unique housing or business unit identifier. The USPS secondary address is stored as an eight character field called the secondary address field in the USPS Address Management System (AMS) II ZIP+4 address coding guide. Appending the secondary address to the end of the DPC results in an extended 19 digit USPS ZIP Code, thereby creating a unique housing unit or business unit identifier.

The extended 19 digit ZIP Code is a six level hierarchical geographic numbering system that uniquely identifies every housing, business and postal delivery unit serviced by the USPS. It is a geographical hierarchical numbering system, because each of the six levels defines a smaller geographic area totally enclosed within the next higher level. Definitions of the first five levels are provided in the Backround section. A description of the sixth level is as follows:

> 19 digit ZIP Code is required to create a unique housing or business unit identifier for multiple unit buildings or equivalents, such as trailer parks or firms receiving large volumes of mail.

The benefits to using the 19 digit ZIP Code as the Spatial Key are:

1. The USPS provides monthly updates to all postal files.
2. The ZIP Code has 6 hierarchical levels.
3. There are very economically priced commercial tools, such as Group 1 and Mailer's Software, that address standardize and assign 11 digit ZIP Codes to files containing raw addresses.
4. Adding the remaining 8 digit code is a fairly basic process for records that require a secondary address to create a unique housing or business unit identifier.
5. There are frequently updated ZIP+4 to latitude and longitude and ZIP+4 to census block translation tables available from the USPS, GDT, Business Location Research (BLR), ETAC and others.
6. There are no technical barriers to creating a DPC to latitude and longitude file if one was required. This would provide the most precise, theatrically possible latitude and longitude assignment of street addresses.
7. There are no restrictions on passing an extended USPS 19 digit ZIP Code outside the regulated telecommunications network because it is not considered customer provided network information.
8. There is a major public safety initiative to change as many RR Box number addresses to street addresses as possible, thus increasing the coverage of the Spatial Keys that can be linked to a precise latitude and longitude.

Although the extended 19 digit ZIP Code is not a perfect universal Spatial Key, it is far superior to the other alternatives for most applications. There are obviously some specific applications where one of the other Spatial Key alternatives could be used. If at some point in the future, the USPS decides to revise the hierarchical numbering system for the ZIP Code, the new ZIP system would most likely then be the preferred choice for a Spatial Key.

APPLICATIONS

The integration of VRU technology with a CTI network and a virtual telephone number database provides a means to support a host of applications that were not previously possible. The partial list of automated and semi-automated examples below is intended to show the overall scope of the benefits derived by the caller, the servicing location and the vanity advertiser made possible by retrieving information from a virtual telephone number database created through Spatial Key linkage.

Automated Applications

The following is a list of exemplary automated applications that utilize the virtual telephone number database created by the Spatial Key linkage technology.

1. Connecting a caller to a servicing location: This application connects the caller directly to a servicing location retrieved from a Spatial Key indexed Client Table based on the caller provided telephone number being physically located inside the retrieved servicing location's exclusive service area geographically defined as any size or shape. High geographic precision of the location is supported. In cases where the caller provided telephone number is located inside multiple non-exclusive service areas, this application provides the caller a VRU menu of retrieved servicing locations names and then directly connects the caller to the closest servicing location or the one selected by the caller. These abilities and features are provided in a integrated common architecture.
2. USPS address retrieval: This application is based on utilizing the caller or caller provided telephone number to retrieve the caller's CASS certified USPS address. The caller's Spatial Key is linked to the Spatial Key coded and indexed USPS address coding guide and the address is retrieved. The VRU speaks the address back to the caller for confirmation in applications requiring 100% accuracy before linking to any other databases. In addition, in a post call process, the retrieved, verified

and stored address and additional linked data can be used by the vanity advertiser to mail to the caller, for example, a requested store coupon, menu, catalog or informational packet.

3. The VRU speaks the service location(s) name, address and/or micro directions (to the caller): Based on a caller provided telephone number, the caller's Spatial Key is used to retrieve location ID(s) of the service location(s) nearest the caller from a Client Table that is associated with the caller's DNIS. The retrieved ID(s) are indexed into the corresponding Service Location table to retrieve the above mentioned information. This can be used by the caller to mail, pickup and/or drop off something to the selected servicing location. Providing the caller with pre-stored micro area directions to the service location(s) is usually used with service locations very small in size, such as Federal Express, UPS and USPS drop boxes, or ATMs located in large physical entities, such as shopping centers or multi-story buildings. These abilities and features are provided in a integrated common architecture.
4. The VRU speaks driveable street directions from the caller's location to the selected service location (to the caller): The caller's Spatial Key is linked to a latitude and longitude which is then fed into a GIS server accessing a latitude and longitude coded and indexed street network database. The database provides a set of directions that are spoken by the VRU. The caller does not need to enter either the source (under normal circumstances) or destination location telephone numbers. In a call parallel application: after transferring the call to the servicing location, the application retrieves the service location's FAX number from a Service Location Table and faxes to the service location the caller's telephone number, address and a map and/or directions from the service location to the caller location to assist the servicing location with delivery to caller. In this case, the GIS server returns the direction data in the form of a map and/or directions and passes this image to the FAX server.
5. Eliminating servicing locations based on days and hours of operation and/or services offered: In the case of multiple servicing locations, the final servicing location list is determined by comparing the days and hours of operation of each service location retrieved from the Service Location table with the day and time of the call. Another method involves having the caller select a pickup or delivery option, (for pizza, for example) and eliminating servicing locations from the list that are not currently open or do not offer the desired service. These abilities and features are provided in a integrated common architecture.
6. Caller profiling based on Census or geodemographic data: The caller provided telephone number is linked to a census block or block group database. The Census Block database contains demographic data, such as race, age, median household size and so forth, or a single numeric geodemographic code that is a composite of the census information which links into a geodemographic code by a product consumption table. Based on the caller's geodemographic code and its product consumption rates, the VRU only presents product options to the caller that the caller is most likely to buy. There are also geodemographic systems that use the ZIP+4 as the base geography instead of the census block.
7. Applications that require the caller's name and/or individual data such as product registration and insurance, loan or credit applications: The caller provided telephone number is linked to a household database containing data, such as name of head of household, street address, number of children in the household and the names of other individuals living in or associated with the household. The VRU can speak these individual names and the caller can identify himself or herself. After the step of identification by name, individual IDs associated with the selected name and stored in the database, such as social security number, state drivers license number, credit card number(s) and bank account number(s), can then be used as a linkage to link to individual ID-indexed databases containing individual data, such as date of birth, credit rating, and so forth. This information can then be provided to the caller, servicing location or vanity advertiser.
8. Business Location Data Retrieval: The caller provided telephone number is linked to a business database containing data, such as name of Business, SIC, Number of employees and DUNS number, which links directly into the DUNS database for credit information. The applications here are very similar to the applications for a household database.
9. Real Property Database Retrieval: Most real property databases are maintained by local government agencies and the data stored in these databases is considered public information. This data is compiled from the public agencies by companies, such as ACXIOM DATAQUICK, and made available to paying clients. Before bidding on a job, for example, a contractor could dial a vanity number that interfaces with an automated property database, enter the telephone number of the supposed residential property owner and verify the ownership, address, mortgage holder and if there are any outstanding liens on the property.

Semi Automated Applications

There are telephone call processing applications where operator decisions and/or assistance are required that can also benefit from a virtual telephone number database. The following are examples:

1. Address Lookup and verification by an operator taking a telephone order: The caller's ANI is passed to the computer system via Integrated Services Digital Network (ISDN) to which the operator's CRT is connected or the operator asks the caller for the telephone number and key enters it. The host computer passes the caller's telephone number over the computer network to the computer storing the Master Table of telephone numbers with corresponding Spatial Keys and the Spatial Key coded USPS National Address database and requests the address associated with the caller's telephone number. This CASS certified address is returned and displayed on the operator's CRT. The operator then asks the caller for the address to which they want the order shipped. If the addresses match, the operator does not have to key enter it and verify the spelling with the caller. This saves both time and money and reduces mistakes. If the addresses are different, there is a high potential that the caller is trying to make a fraudulent order and the operator would ask additional questions required to make this determination.
2. Real Time Address to Spatial Key Coding and Spatial Key to Client Table with Off-Line Master Table update: A caller is trying to be connected to a servicing location

and has provided a valid telephone number that is not in the Master Table. The call is transferred to an exceptions handling operator and the telephone number and DNIS are passed via ISDN to the operator's host computer and displayed on the operator's CRT. The operator asks for the caller's address and key enters it. The operator then presses a function key that calls a program that USPS standardizes the address and assigns a Spatial Key. The operator validates the standardized address with the caller. If it validates, the operator then presses another function key that passes the Spatial Key and the DNIS to a program that brings up a list of servicing location(s) with their telephone numbers on the CRT screen. The operator then asks the caller which one they prefer and transfers the call by highlighting the selected service location and pressing another function key. The captured telephone number and Spatial Key are stored on disk or other mass storage and are retrieved later by another process that updates the Master Table which supports multiple clients and applications.

3. "911" application: In a real time Public Health and Safety applications, the caller places an emergency call to the emergency telephone number "911." The caller's telephone number is passed by Caller ID to the answering hardware which passes the information via ISDN to a Geographic Information System (GIS) computer with large CRT graphic terminals in front of dispatching operators. The system looks up the caller's Spatial Key in a Master Table and then looks up the caller's latitude and longitude in a Spatial Key to Latitude and Longitude table and the caller's address from the Spatial Key coded and indexed USPS address coding guide. The caller's location is then displayed in the map window on the answering dispatcher's CRT along with the street network and the current location of all emergency vehicles by type and status. The caller's address is displayed in the address window. Based on the type of emergency and the current location and status of the emergency vehicles, the dispatcher determines which vehicles(s) to dispatch and when they should be dispatched.

The call processing system includes means for receiving network provided call information or means for prompting and receiving optional caller provided input to capture a valid first location telephone number. The call processing system further includes a process for indexing the valid first location telephone number into at least one Master Telephone Number to Spatial Key database to retrieve information associated with the first location's telephone number and a means to provide the received and retrieved information associated with the first location's telephone number to provide one or more improvements to the service of at least one call recipient.

The improvements in service are provided to one or more of the following recipients: a caller, a servicing location and/or a vanity number advertiser. These improvements in service or benefits are provided either during the call, parallel to the call, and/or post call. The service benefits include the following: determining the selected servicing location telephone number and providing it to the network to automatically connect the caller to the selected servicing location; determining that the caller requires operator assistance and providing the network with the information required to connect the caller to a vanity advertiser operator; and/or providing one of a plurality of informational items.

The improvements in service illustrated in the application examples all relate to a consumer or business dialing a business or government vanity number. However, at some future point in time, the CTI network will evolve to where the called party can also be a consumer. At this future point in time, the called consumer can have access to all the information related to the calling telephone that the servicing locations and vanity advertisers have in the above examples, such as having the name, address, caller type (consumer, business, pay phone or government, etc.) associated with the calling telephone displayed on his or her future-generation caller ID box before he or she answers the telephone.

The preferred process uses the full 10 digits of the North American Dialing Plan 10 digit telephone number as the telephone number. Obviously, if the system were implemented within a single NPA with no overlapping NPAs, a 7 digit number could easily be substituted by one skilled in the art. Also, if at some point in the future, the North American dialing plan were revised or replaced with another plan, the process would still function the same way with a different number of digits.

The call processing system includes a process for validating the received telephone number. This process includes at least one of the following: verifying the telephone number is ten digits in length, only contains the numbers 0 through 9, and digits one and four are the numbers 2 through 9 inclusive; comparing the received NPANXX against an Area Code Split File and updating the received NPANXX; indexing the received NPANXX against a Local Exchange Routing Guide (LERG) file and determining the validity of the received NPANXX-XXXX; and comparing the received NPANXX against a V&H coordinate file to determine the type of NPANXX and the location of the NPANXX.

The Master Telephone Number to Spatial Key database is a Virtual Telephone Number database created via Spatial Key linkage. It is created by combining a Master Telephone Number to Spatial Key database with a Spatial Key indexed database. The invention also includes a set of processes to maintain the Master Telephone Number to Spatial Key database: a process for data providers to provide Master Table Verification Records; a process to Build Master Table Update Records from Data Provider Supplied Verification Records; a Master Table Update preprocess; and a Master Table Update process.

The Spatial Key indexed database includes one of the following. Spatial database, Geographic database, USPS Address database, Household database, Individual database linked to a Household database, Business Locations database, Business Financial database linked to a Business Locations database, Government Locations database, Property database, Client Table, or Service Locations Table linked to a Client Table.

The call processing system is designed in a modular manner to support many different clients or advertisers with many different applications. The set of system modules required to satisfy a specific client application is generally only a subset of the total system capabilities. These individual primary modules are summarized below. They include providing a means for:

1. Spatial Key database coding and maintenance.
2. Providing caller communication with a CTI network.
3. Capturing and validating the caller provided telephone number and the vanity number dialed.
4. Linking the captured telephone number to a Spatial Key via a Master Telephone Number to Spatial Key table.
5. Linking the Spatial Key to Spatial Key coded and/or indexed spatial, geographic, USPS address, household,

individual, property, business location, government location record databases to retri[illegible] associated with the caller.

6. Linking the Caller's Spatial Ke[illegible]e location ID(s) or telephone number(s) stored [illegible] pre-built and Spatial Key coded and indexed Client Table associated with the vanity number dialed (DNIS).

7. Linking the servicing location ID(s) or telephone number(s) retrieved from the Client Table to other service location specific data stored in a Service Locations table associated with the vanity number dialed and indexed by ID or telephone number.

8. Connecting the caller to an exceptions handling operator or system.

9. Spatially relating, in the form of a map or directions, the caller provided telephone number location with the selected servicing location.

10. Connecting or transferring the caller to a servicing location.

11. Storing selected call information to be accessed later by the caller, the serving location, and/or the vanity advertiser.

12. Providing call, call parallel and/or post call information to the caller relating to the servicing location and/or the spatial relationship between the servicing location and the location of the caller provided telephone number.

13. Providing the caller with a post call communications.

14. Providing call, call parallel and/or post call information to the vanity number advertiser and the servicing location(s) regarding the ANI, DNIS, caller provided telephone number and corresponding Spatial Key, and data retrieved or processed from databases using the Spatial Key as a linkage means.

15. Providing the vanity number advertiser and servicing locations post call communications.

One aspect of the present invention includes, in a computer telephone integration (CTI) network, a call processing system, comprising a master table of telephone numbers with spatial keys; means for capturing a first location telephone number; means for validating the captured telephone number; means for indexing the validated first location telephone number into the master table to retrieve the spatial key of the first location's telephone number; means for indexing the retrieved spatial key into at least one spatial key indexed database to retrieve, by spatial key linkage, information associated with the telephone number of the first location; and means for communicating the retrieved information associated with the telephone number of the first location to at least one recipient selected from a vanity number advertiser, a caller or a servicing location.

Another aspect of the present invention includes, in a computer telephone integration (CTI) network, a method of call processing comprising the steps of capturing a telephone number associated with a first location; indexing the captured telephone number into a master table of telephone numbers and associated spatial keys; retrieving the spatial key of the indexed telephone number; indexing the retrieved spatial key into at least one spatial key indexed database; retrieving, by spatial key linkage, information associated with the telephone number; and communicating the retrieved information associated with the telephone number to at least one call recipient that comprises a vanity number advertiser, a caller or a servicing location.

Another aspect of the present invention includes, in a computer telephone integration (CTI) network, a call processing system, comprising a master telephone number associated information database; means for capturing a telephone number of a first location; means for indexing the first location telephone number into the master database to retrieve information associated with the telephone number of the first location; and means for communicating the retrieved information associated with the telephone number of the first location to at least one recipient comprising a vanity number advertiser, a caller or a servicing location.

Yet another aspect of the present invention includes, in a computer telephone integration (CTI) network including a master telephone number associated information database, a method of call processing, comprising the steps of capturing a telephone number of a first location; indexing the first location telephone number into the master database; retrieving information associated with the indexed telephone number; and communicating the retrieved information associated with the telephone number to at least one recipient selected from among a group comprising a vanity number advertiser, a caller and a servicing location.

Another aspect of the present invention includes, in a computer telephone integration (CTI) network, a method of generating a master telephone number to spatial key database including a plurality of records, one of the records comprising a telephone number, a spatial key, and information related to the telephone number and the spatial key, the method comprising the steps of providing a master database of telephone numbers including a plurality of records, one of the records comprising a telephone number; utilizing a data provider verification file, said file having a plurality of records, wherein one of the records comprises a telephone number, a spatial key, and related data; identifying a record from the master database of telephone numbers having a telephone number that matches a telephone number in a record of the data provider verification file; appending a spatial key and related data from the data provider verification file to the matching record of the master database of telephone numbers, thereby generating an intermediate database; providing a master database of spatial keys, comprising a plurality of records, one of the records comprising a spatial key; comparing a record from the intermediate database to records of the master database of spatial keys to identify a spatial key match; appending the telephone number and the data provider related data from the record of the intermediate database to the matching record of the master spatial key database, wherein the resultant record does not include the telephone number and the spatial key from the data provider verification file.

Yet another aspect of the present invention includes, in a computer telephone integration (CTI) network, a method of call processing comprising the steps of capturing a first location telephone number during a call; validating the captured telephone number; indexing the validated telephone number into a master table of telephone numbers and associated spatial keys; transferring the call to an exceptions handling operator if the validated number is not present in the master table; obtaining an address associated with the validated telephone number; assigning a spatial key for the address; connecting the call to a service location based on the spatial key and a dialed number; and storing the validated telephone number and the spatial key.

Another aspect of the present invention includes, in a computer telephone integration (CTI) network, a method of maintaining a call processing master table, comprising the steps of capturing a first location telephone number during a call; validating the captured telephone number; indexing the validated telephone number into a master table of

telephone numbers and associated spatial keys; transferring the call to an exceptions handling operator if the validated number is not present in the master table; obtaining an address associated with the validated telephone number; assigning a spatial key for the address; storing the validated telephone number and the spatial key; and updating the master table by use of the stored validated telephone number and the spatial key.

These and other objects and features of the present invention will become more fully apparent from the following description and appended claims taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF DRAWINGS

FIG. **1** is a high-level conceptual diagram illustrating multiple databases linked together via a Spatial Key to create a Virtual Telephone Number database;

FIG. **2** is a network diagram illustrating a preferred network design for utilizing the databases of FIG. 1;

FIG. **3** is a block diagram of the call processing center **213** of FIG. **2**;

FIG. **4** is a block diagram of the remote database location **231** of FIG. **2**;

FIG. **5** is a block diagram of the telecommunications network **212** of FIG. **2** illustrating different call routing alternatives;

FIGS. **6A** and **6B** is a system level flow diagram of a presently preferred Call Center Call process using the databases shown in FIG. **1** and the network shown in FIG. **2**;

FIG. **7** is a flow diagram illustrating the process of validating and adding intelligence to an input telephone number by retrieving information from the telephone number indexed databases indicated at function **308** in FIG. **6**;

FIG. **8** is a flow diagram illustrating the Spatial Key retrieval and verification of caller dependent Spatial Key Data process indicated at **320** in FIG. **6**;

FIG. **9** is a flow diagram of a process for communicating with a caller or servicing location using the Parallel Call process as indicated at **330** in FIG. **6**;

FIG. **10** is a flow diagram of a process for generating a CASS certified address from a Spatial Key for use in the databases indicated at **106** in FIG. **1**;

FIG. **11A** is a block diagram of a process for a data provider to provide Master Table verification records;

FIG. **11B** is a block diagram of a process for building Master Table update records from data provider supplied verification records;

FIG. **11C** is a block diagram of a Master Table Update preprocess;

FIG. **11D** is a block diagram of a Master Table Update process;

FIG. **12** is a flow diagram illustrating the Phone Number Sort, Match and Append process as indicated at **422** in FIG. **11B**;

FIG. **13** is a flow diagram of the process for reading a LERG file as indicated at function **606** in FIG. **12**;

FIG. **14** is a flow diagram of the process for reading a Data Provider Verification file as indicated at function **610** in FIG. **12**;

FIG. **15** is a flow diagram of the process for incrementing a LERG List as indicated at function **618** in FIG **12**;

FIG. **16** is a flow diagram of the process for writing an Invalid Telephone Number file as indicated at function **630** in FIG. **12**;

FIGS. **17A** and **17B** are a flow diagram illustrating the ZIP+6 and Unit Number Sort, Expand, Match and Append process as indicated at **432** in FIG. **11B**;

FIGS. **18A**, **18B** and **18C** are a flow diagram illustrating the Master Table Update process as indicated at **456** in FIG. **11D**;

FIG. **19** is a flow diagram of the process for reading a Data Provider Updates database as indicated at function **836** in FIG. **18C**;

FIG. **20** is a flow diagram of the process for reading the Master Table as indicated at function **838** in FIG. **18C**; and

FIG. **21** is a flow diagram of the process for writing an Updated Master Table as indicated at function **846** in FIG. **18C**.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

The following detailed description of the preferred embodiments presents a description of certain specific embodiments of the present invention. However, the present invention can be embodied in a multitude of different ways as defined and covered by the claims. In this description, reference is made to the drawings wherein like parts are designated with like numerals throughout.

For convenience, the discussion of the preferred embodiments will be organized into the following principal sections:

I. Virtual Telephone Number Database Description

II. CTI Network Description and Functionality

III. Call Center Call Processing System

IV. CASS Certified Address Build

V. Master Table Build and Maintenance Description

I. VIRTUAL TELEPHONE NUMBER DATABASE DESCRIPTION

FIG. **1** illustrates how a telephone number can be enhanced with almost an unlimited amount of attribute data. Traditionally, for most clients and their telecommunications call processing applications, telephone number databases have either not been available, contained only bare telephone numbers with standard telecommunications network call detail report data, such as time and length of call, or contained only a few previous caller or customer records with limited amounts of manually captured and recorded telephone number attribute data.

FIG. **1** shows many different types of databases in an outer database ring **101** with their corresponding Spatial Key Linkage Translation indices shown in a middle ring **103**. Three of the database types (**106**, **108** and **110**, and **112** and **114**) do not have a corresponding Translation index because they are indexed by a Spatial Key making the Translation index unnecessary. For descriptive purposes, a Spatial Key indexed database is defined to be any database that is accessed directly via the Spatial Key or indirectly through a Spatial Key Translation index.

Referring to FIG. **1**, a functional flow using Spatial Key linkage technology will be described. A caller's or caller provided telephone number and a DNIS are passed to a process for updating, validating, classifying, and screening that utilizes a set of Telephone Number Databases indexed by Telephone Number **100**. This process is further described in conjunction with FIG. **7** hereinbelow. The resultant processed telephone number is used to access a Phone Number to Spatial Key or Master Table **102** to retrieve a Spatial Key

104. The Spatial Key **104** is then used to directly access data in the databases (e.g., **106, 108** and **110**, and **112** and **114**) that do not require a translation index. Otherwise, the Spatial Key is used by a translation index to retrieve a secondary index (e.g., voting district ID from index **128**) for accessing databases (e.g., **118, 122, 126, 130, 134**) requiring a translation index. The resultant database information, the caller's telephone number and the DNIS are then used to connect the caller to a servicing location and/or provide service location related information.

The Telephone Number to Spatial Key Translation index **102** (Master Table) could be combined with the Spatial Key indexed databases by an offline merge, append and/or link process to create telephone number indexed databases containing all of the above illustrated information. These combined master telephone number indexed database(s) would obviously be more maintenance intensive because of the magnitude of the offline maintenance required to synchronize telephone number changes, client service location changes and maintaining the spatial relationship between the telephone number and each client's service locations, but such combined databases would provide slightly faster data access times.

FIG. **1** illustrates a one-way linkage starting with a telephone number. Referring to FIG. **1**, one skilled in the art could see the Spatial Key linkage technology could be used for applications that do not start with a telephone number. In another embodiment, for example, by starting with a client location instead of a telephone number, one could generate a list of all telephone numbers of potential customers serviced by the selected location. In yet another embodiment, by starting with a name and address, one could determine the telephone number(s) for that address and the other individuals living at that address. This is a directory assistance type of application.

The specifics for each database type (of FIG. **1**) in terms of data components, sources, Spatial Key coding and maintenance issues will be discussed in detail in the following sections.

Telephone Number Databases Indexed by Telephone Number (100, FIG. 1)

There are three types of databases that fall within this category: Telephone number changes, verification and classification databases; client specific customer databases; and negative or inverse lists. These databases must all be updated monthly and synchronized to a given date in the month. The 15th of the month is the preferred date, but any day could be selected.

Regarding telephone number changes, verification and classification, the official source is Bellcore. They publish a variety of publicly available files, with the most comprehensive being the Local Exchange Routing Guide (LERG) files and their derivatives. Bellcore releases files on a monthly basis. The date that NPANXXs change, are added or are deleted is provided with the files. The files must be updated monthly to coordinate the changes that will occur in the following month.

The Telephone Number Databases Indexed by Telephone Number generally indicated at **100** (FIG. **1**) comprise several files, lists, or databases. The preferred databases **100** include a NPANXX Split file, a LERG6 file, a V&H Coordinate file, one or more Customer databases, and a Negative database. These databases will be described in conjunction with FIG. **7**, along with a process **308** (FIG. **7**) of adding intelligence to the input telephone number by retrieving information from these telephone number indexed databases during the call. This process can be considered a detailed expansion of block **100** (FIG. **1**). Other databases may be utilized in other embodiments.

Telephone Number to Spatial Key (Master Table) (102, FIG. 1)

The completeness, currency and accuracy of the Master Table is the key to the efficiency and functionality of all applications. In order to build and maintain the most complete, current and accurate Master Table possible, the table must be created from multiple sources. In addition, since the Master Table is designed to be used by both regulated and non-regulated entities in the regulated telephone network, none of the Master Table data can be customer provided network information.

There are four separate processes to build and maintain the Master Table. These process are as follows:

1. Process for Data Provider to Provide Master Table Verification Records (FIG. 11A)
2. Process to Build Master Table Update Records from Data Provider Supplied Verification Records (FIG. 11B)
3. Master Table Update Preprocess (FIG. 11C)
4. Master Table Update Process (FIG. 11D)

These Master Table build and maintenance processes are further described hereinbelow.

Spatial Key (104, FIG. 1)

The preferred Spatial Key is the 19 digit code used to link databases together.

USPS Address Databases Indexed by Spatial Key (106, FIG. 1)

There are two USPS databases required to build a USPS CASS certified address from a Spatial Key: a City State file and a ZIP+4 Address Coding Guide. There is one City State detail record for each 5 digit ZIP code and one or more ZIP+4 Addresses Coding Guide records for each unique ZIP+4. The ZIP+4 Address Coding Guide contains multiple records in a situation where there is a multiple set of secondary address ranges associated with a single ZIP+4. The use of these two USPS databases to build a USPS CASS certified address from a Spatial Key will be described in conjunction with FIG. **10** hereinbelow.

Business and Government Location Databases Indexed by Spatial Key Containing DUNS Number (108, FIG. 1)

A preferred Business and Government Locations File **108** is a DUNS file. The ten million plus record file contains a business or government name and both a physical and mailing address, if they are not both the same. Each address is run through DPC coding software, as described in process **402** of FIG. **11A**, and an 11 digit ZIP Code is assigned. If the address contains a secondary address, such as a Suite #, then it is reformatted into an eight digit field according to the rules described in process **432** of FIG. **11B**. If there is no secondary address, the last eight digits are set to all blank characters. The 11 digit segment and the eight digit segment are concatenated together to form the 19 digit Spatial Key, and a file index is created on this key.

It is now a basic process to look up a Spatial Key in the file and retrieve the location record data associated with the

Spatial Key, including the location's DUNS number and its parent's DUNS number if the location is owned by a higher level corporate entity.

Business Database Indexed by DUNS Number (110, FIG. 1)

The DUNS' numbers retrieved above (database **108**) can then be used to access a DUNS Corporate database **110** to obtain names of corporate officers and credit history information. This is very valuable in many types of business to business transactions.

Household Databases Indexed by Spatial Key containing Individual Names and IDs (Social Security Number) (112, FIG. 1)

A preferred Household database **112** is ACXIOM's OMNIBASE database. This 100 million plus record database is Spatial Key coded and indexed as described above. For each household record it contains many household characteristics, such as name of head of household, date of birth of head of household, estimated household income, and so forth. It also links to 265 million individuals known to be associated with one or more households. For each individual, the database contains their name, date of birth, social security number, driver's license number and other similar data.

It is a straightforward process to look up a Spatial Key in the OMNIBASE database and retrieve the associated household and individual data. Another application that is conducive to hierarchical Spatial Key retrieval from the database is a nearest neighbor application.

Individual Databases Indexed by Individual ID (Social Security Number) (114, FIG. 1)

There are three major individual databases **114** that are indexed by social security number: TRW, Equifax and TransUnion (TU). The preferred database is the TU database. Once an individual's social security number has been retrieved from above (database **112**), it is a basic process to use the social security number as a means of retrieving credit and public record data associated with the social security number from the TU database.

Polk and some states provide access into their driver license databases based on knowing a driver's license number. Again, once this is retrieved from database **112** above, it is a basic process to access this data. This data contains driving history, and in some cases, linkage to vehicle registration data. An automobile make and model associated with the household and individuals can be retrieved from the vehicle registration data.

Spatial Key to Parcel Number (116, FIG. 1)

A Spatial Key to Parcel Number Translation index **116** is created by ACXIOM by extracting property address, owner address and parcel number from the DATAQUICK database. The parcel number is usually the FIPS Code of a local government entity responsible for managing title and/or property taxes to real property plus the locally assigned parcel number. The addresses are Spatial Key coded as previously described and the Parcel Number Translation database is created with the following fields and indexed by Spatial Key:

Spatial Key

Parcel Number (government entity code+local parcel number)

Spatial Key Type Code (O=Owner or P=Parcel)

It is a straightforward process to index a Spatial Key into this Translation database and retrieve all parcel numbers associated with the Spatial Key.

Property Database Indexed by Parcel Number (118, FIG. 1)

The ACXIOM DATAQUICK database is indexed by parcel number based on parcel number(s) retrieved above from index **116**. Information, such as owner, liens, mortgage amount, mortgage lender, purchase date is available for the individual parcel or all the parcels associated with the owner's tax address.

Spatial Key to Latitude and Longitude (120, FIG. 1)

A preferred Spatial Key to Latitude and Longitude database **120** is the GDT ZIP+4 to Latitude and Longitude file. This database is currently updated quarterly. Latitude and longitude are provided in NAD27 in millionths of a degree. Each record also contains the USPS ZIP+4 type and the precision with which that latitude and longitude were assigned: ZIP+4 centroid, ZIP+2 centroid or ZIP centroid. There are approximately 28 million street, firm and high-rise ZIP+4s that have been latitude and longitude coded to their ZIP+4 centroid by matching against enhanced TIGER files called DYNAMAP®, available from Geographic Data Technology, Inc (GDT). This file is indexed by ZIP+4 and it is a straightforward process to lookup a ZIP+4 on the file and retrieve the latitude and longitude associated with the ZIP+4.

In the not too distant future, a ZIP+6 to Latitude and Longitude file will most likely become available. At that point in time, with all other issues being equal, it would become the preferred translation file and could be incorporated into the system without any modifications other than changing the size of the key from 9 digits to 11 digits.

Spatial Databases Indexed by Latitude and Longitude Quadtree (122, FIG. 1)

There are many types of Spatial databases **122** available from many different sources. In general, they are classified into 0-D, 1-D and 2-D databases and networks. The terms 0-D, 1-D and 2-D correspond to the number of dimensions: a zero dimensional database contains points such as the latitude and longitude point where two or more street segments intersect; a one dimensional database is a database of line segments, e.g., two latitude and longitude points connected by a straight line, such as the street segment connecting one intersection to the next intersection; and a two dimensional database is a database of areas defined by polygons or circles, such as a census block defined by a three or more point latitude and longitude polygon boundary. A general definition of a GIS or spatial network is a system to link related 0-D, 1-D and 2-D databases together. For example, the GIS network provides the means to know what other street links connect to a starting street link, what other links or points the link crosses, and what areas the link borders or crosses. A spatial database is not like other databases and has three components: the spatial data, the spatial network and a spatial data network interface or application program interface (API).

Consequently, there are many different proprietary spatial database network designs with various strengths and weaknesses. Unfortunately, spatial data cannot always be moved from one network design to another without some distortion, and there is no "best" spatial database and network for all applications.

Fortunately, from an API perspective, almost all spatial database systems will accept one or more 0-D, 1-D, and/or 2-D latitude and longitude defined inputs and return a result that can be easily handled by the calling application. For example, in the area of driveable street directions and maps, the preferred spatial database system is from ETAC which specializes in automobile navigation systems. In most major markets, ETAC has enhanced the TIGER files by classifying streets by type, identifying one way streets and streets with no right or left turn restrictions. ETAC's street information, network design and API were created primarily to provide driving directions in the form of text or various resolution street maps stored as bitmaps. This makes ETAC a clear supplier for GIS applications related to providing driveable directions and street maps.

On the other hand, in terms of general spatial database processing platforms supported and spatial database manipulation, Environmental Systems Research Institute, Inc. (ESRI®) in Redlands, Calif. has no equal to its ARCINFO product. Many spatial database providers such as GDT provide their spatial data in ARCINFO format, as well as formats to support SMI and MapInfo.

There are many specialized spatial database suppliers. For example, Vista Environmental provides 0-D and 2-D environmental data for underground storage tank locations, hazardous waste spill locations, hazardous material storage locations and hazardous material dump site areas. There are other spatial database providers that have spatial databases of shopping centers, financial institutions with deposits, restaurants by type, ATMs, drop boxes, fire hydrants, flood planes, earthquake fault lines, power lines and so forth.

Information from all these databases is now accessible by simply passing a latitude and longitude definition, an information request and a returned information format request to the GIS API.

Spatial Key to FIPS Code (124, FIG. 1)

A preferred Spatial Key to FIPS Code (census block) database **124** is a GDT ZIP+4 to 1990 Census Block file. This file is currently updated quarterly. The ZIP+4 can change monthly, while the census blocks change only with each decennial census.

This file is indexed by ZIP+4 and it is a straightforward process to look up a ZIP+4 on the file and retrieve the census block associated with the ZIP+4. In a very small percentage of cases, there can be two or more census blocks associated with a ZIP+4.

Census Geography Databases Indexed by FIPS Code (126, FIG. 1)

In terms of Census Geography databases **126**, there are four different types: most recent census data, updates and projections, geodemographic systems and other data reported by census geography.

The preferred source for the most recent (e.g., 1990) census small geographic area data is the U.S. Census Bureau. They publish two sets of small area data files called the Summary Tape Files (STF). These files are divided into two groups: 100% count data, published as STF1 data and sample data, published as STF3 data. STF1 data is available for each of the 6.3 million census blocks and higher level geographies. Each geography record contains several hundred demographic variables, such as population counts by race and age and household counts by property value. The STF3 files are published for the 223 thousand census block groups and higher level geographies. Each geography record contains an additional several hundred demographic variables, such as average household income and counts of head of households by age and by income.

In terms of updates and projections, there are two major suppliers with equal reputations: Claritas and Equifax National Decision Systems. These suppliers provide current year estimates and five years projections for population, households, population by age, households by income, head of household age by income and other data for block group geography and above.

Again, both Claritas and Equifax National Decision Systems provide geodemographic systems. A geodemographic system is a classification system where each geographic area is classified into a single code based on the demographic and other characteristics associated with the geographic unit. There are usually between 40 and 100 unique sequential numeric codes in a geodemographic system. These systems were initially available for only census geography, but are now available for both census geography and postal geography. The value of the system is that there are individual company customer databases and syndicated panel databases containing as many as 50,000 panel members from suppliers such as Simmons, National Panel Data (NPD) and Mediamark Research Institute (MRI). Based on the customer or panel member address, they are assigned a geodemographic code. These customers or panel members have purchased products or filled out questionnaires on products and services. These panel databases are tabulated by geodemographic code and by product creating geodemographic consumption propensity tables of several thousand products and/or services with purchasing rates by geodemographic code. This data is readily accessible by looking up a FIPS code in a census geography database and retrieving the geodemographic code. Then by looking up the geodemographic code in the geodemographic consumption propensity table, the consumption propensity for the desired product or service can be retrieved.

There are special databases that are provided by government agencies such as the Federal Deposit Insurance Company (FDIC). The FDIC requires all FDIC controlled lending institutions to report all applications for home mortgage loans by age, race, loan amount, loan status and the census tract of applicant property. The FDIC publishes this data in an electronic form on a quarterly basis. This data is tabulated by census tract and provided by companies such as Claritas and Equifax.

All the above-mentioned data is readily accessible by looking up a FIPS code in a Census Geography database and retrieving the desired dependent data.

Spatial Key to other ID (128, FIG. 1)

In addition to census geography codes and latitude and longitudes, the TIGER files also containing voting precinct codes and school district codes for each street link. The same process used by GDT and others to create a ZIP+4 to Census Block file can also be used to create a ZIP+4 to Voting Precinct file and a ZIP+4 to School District file, for example. These files have not previously been created because of lack of demand. However, there will most likely be a ZIP+4 to

Voting Precinct file available from GDT prior to a general election. By indexing this file by ZIP+4, it is a straight forward process to look up a ZIP+4 on the file and retrieve the voting precinct associated with the ZIP+4.

Other Geography Database such as Voting District Indexed by Voting District ID (130, FIG. 1)

There are statistical summary files from governmental agencies that provide the number of registered voters by party and by voting precinct. For example, as a general election gets closer, both parties and news agencies will seek public opinion on various issues and candidates. Using a 800 or 900 number, callers placing votes can be tabulated in real time and the caller's precinct dependent data can be looked up and statistically modeled to provide national level estimates and voting statistics by party.

Spatial Key to Location ID (DNIS Dependent Client Table) (132, FIG. 1)

This translation table is called a Client Table 132 and the procedure for building it is described in detail in Applicant's patent entitled "Automatic Routing System for Telephonic Services", U.S. Pat. No. 5,506,897, which is hereby incorporated by reference. In summary, a Client Table record is created for each ZIP+4 that spatially lies inside a service location's service area defined as a geographic area of any size and shape. This process is repeated for each service area and the resultant file is sorted and indexed by ZIP+4 creating the Client Table. The Client Table can be indexed by ZIP+4 to retrieve a service location ID. There is one Client Table per Client that is identified by the DNIS.

Client Locations Databases with Services Areas of Any Size or Shape Indexed by Location ID (134, FIG. 1)

These are basic "one record per service location" databases 134 indexed by Location ID. They can contain almost any type of service location data, such as, but not limited to, the following: name, address, latitude/longitude, service area type and latitude/longitude definition, telephone number, FAX number, E-Mail address, days and hours open, micro area directions, store promotions and events, and store product inventories or menus and prices. There is one Client Locations database 134 per client that is identified by DNIS.

II. CTI NETWORK DESCRIPTION AND FUNCTIONALITY

CTI Network Major Components

Referring to FIG. 2, a CTI network 200 is composed of five Major components:

1. Caller locations, such as 202, 204;
2. Servicing locations, such as 246, 248, 250,
3. National Telecommunications Network 212;
4. Call Processing Center 213; and
5. Remote Database Processing Center 231.

The CTI network 200 is used to provide service and information to the caller at a calling location (e.g., 202 or 204), servicing location (e.g., 246 or 248) and/or vanity number advertiser (not shown). The vanity number advertiser can be considered to be any entity that has advertised, published and/or owns the rights to the dialed number. The calling locations are connected to the National Telecommunications Network 212 by one or more lines 210 (to each calling location), which may be a single public switched telecommunications network (PSTN) line, multiple lines, an ISDN line (that can carry voice and data), a cellular or personal communications service (PCS) link, a microwave connection, a satellite link, and so forth. The network 212 is linked to the call processing center 213 by a plurality of bidirectional channels. These channels include connections to a VRU 214, one or more routing processors 226, a fax server 238, a modem server 240 and an Internet server 242. The network 212 is further connected to a plurality of service locations by one or more lines 244 (to each service location). These lines 244 are of similar types enumerated above in conjunction with the calling lines 210.

The call processing center 213 includes a plurality of databases as will be described below. One or more of these databases may be located at a remote database location 231. A gateway 230 at the center 213 enables connection via a bidirectional channel to the remote database center 231.

A telephone call that initiates at a calling location may be routed through the network 212 by use of the call processing center 213 and/or information about a caller, servicing location or advertiser may be provided to the caller, servicing location, or advertiser through the network 212 by use of the center 213. The call processing center 213 provides the intelligence of where the call is to be routed or the information to be provided to the caller, servicing location and/or vanity advertiser. The network 212 receives this data and acts on it as directed by the center 213. The center 213 may optionally access databases at a remote location, such as at remote database center 231. The network 212, the center 213 and the remote location 231 will be further described hereinbelow.

Caller Locations

All caller locations, e.g., 202, 204, must have a telephone such as telephone 205. The telephone can either be a Touchtone, a rotary telephone, or an emulated telephone. With a Touchtone telephone, the caller is able to provide input via the telephone key pad using Dual Tone Multi-Frequency (DTMF) or by voice. With the rotary telephone, input is limited to voice. There are numerous Touchtone and rotary telephone manufacturers. The Touchtone phone manufacturers manufacture many different makes and models of telephones with Touchtone capability, such as single line telephones, multiple line telephones, Videophones, cordless telephones and cellular telephones. There are also computers that can emulate a telephone such as a Personal Digital Assistant (PDA) or a regular desktop or portable computer with a microphone, speakers and telephone emulation software, such as Microsoft Phone connected to a telephone network via a telephone line with a modem or a cellular modem.

The caller location can also have a FAX 203. This is only used in Call Parallel (multiple telephone lines required at caller location) or Post Call processes. There are many Fax manufacturers and personal computers with a FAX modem and FAX emulation software that can emulate a fax.

The caller location can also have a computer 207 with a modem and/or ISDN card. The computer 207 is used in Call Parallel (multiple telephone lines at caller location required for modem) or Post Call processes. In another embodiment, the Call Parallel process can be performed on a single phone line by utilizing a digital simultaneous voice data (DSVD) modem, such as a Sportster Vi 28.8 Kbps fax modem from U.S. Robotics Inc., or by use of an ISDN line.

Servicing Locations

There are three types of servicing locations:

1. Servicing locations with no communications means **250**: These locations include drop boxes and ATMs. This type of location only supports customer pickup or drop off.
2. Servicing Locations with a telephone **246**: A telephone is required to answer customer calls and may be of any of the many types of telephones described above.
3. Servicing Locations with a telephone and other communication means **248**: A telephone is used to answer customer calls and a FAX and/or computer can be used in Call Parallel and Post Call processes. The FAX and computer specifications are the same as those described in the caller location section above. In some cases, a vanity advertiser location can be a special purpose service location. If the service location computer is a CTI computer and includes an ISDN card or a modem, a multitasking operating system, such as Microsoft Windows NT, telephone emulation software, such as Microsoft Phone, and is logged into the call processing center Internet server **242**, the servicing location has the same database access capabilities as the call center operator described below.

National Telecommunications Network **212** (FIG. 2)

The National Telecommunications Network **212** provides the switch and transmission infrastructure to connect and transmit voice, network information and data between the caller location, e.g., **202** or **204**, the servicing location, e.g., **246** or **248**, and the CTI network **200**.

There are two classes of vanity number type calls: Class 1 telephone calls are calls wherein the final terminating location is a servicing location determined by intelligence outside the telecommunications network. There are three separate architectures for class 1 calls. Class 2 telephone calls are calls where the final terminating location is the network terminating point of the vanity number. Class 2 calls utilize one architecture, wherein the call terminates at the VRU **214**. The network **212**, the classes and the architectures will be further described in conjunction with FIG. 5.

Call Processing Center **213** (FIG. 2)

The call processing center **213** which is, in essence, a service bureau for the vanity advertiser, is the central hub of the entire operation in supporting the caller, the vanity advertiser and the servicing locations. The preferred call processing center **213** is AT&T American Transtech (ATT) located in Jacksonville Fla. The center **213** interconnects with the national telecommunications network **212** and an optional remote database location **231** by the channels shown in FIG. 2. The call processing center **213** will be further described in conjunction with FIG. 3 hereinbelow.

Remote Database Processing Center **231** (FIG. 2)

One or more of the databases shown in FIG. 1 and utilized by the call processing center **213** may be physically located at a location remote from the center **213**. This may occur, for example, for reasons of convenience, ease of maintenance, security, legal issues, regulatory issues and so forth. From a purely technical perspective, all of the databases shown in FIG. 1 could be located at the call processing center **213**. A mainframe computer **232** at the remote processing center **231** is connected to a call processing center dual LAN **216** by the gateway **230**. The remote database center **231** will be further described in conjunction with FIG. 4 hereinbelow.

Call Processing Center **213** (FIG. 3)

Referring to FIG. 3, the Call Processing Center **213** will now be further described. The call processing center **213** replaces the network operator or the initial answering party as it responds to input from the network **212** and the caller location, e.g., **202** or **204** (FIG. 2), retrieves information from various accessible databases, and uses this information to route the call to a service location, e.g., **246** or **248**, or exceptions handling operator **222**. In addition or alternatively, the call processing center **213** provides the caller at location **202** or **204**, the servicing location **246** or **248**, or the vanity advertiser (not shown) with application dependent information during the call, parallel to the call or post call by a variety of communications means.

The call processing center **213** includes the dual LAN **216** to which the VRU **214**, the FAX server **238**, the modem server **240**, the Internet server **242**, a SQL database server **218**, a PBX/ACD CTI gateway **220**, a CTI enabled host **224**, one or more routing processor(s) **226**, and the gateway to the remote database processing center **230** all bidirectionally interconnect. The dual LAN **216** comprises a primary LAN and a secondary LAN as a backup to provide fault-tolerant service. The LAN **216** utilizes the Transmission Control Protocol/Internet Protocol (TCP/IP) protocol. The PBX/ACD CTI gateway **220** and the CTI enabled host **224** each further connect to one or more human operators **222** as will be described hereinbelow. The SQL database server **218** further interconnects to the Telephone Number Validation and Type databases **100**, the Client Location databases **134**, the Client Tables **132** and a Call Transaction storage **236**. The routing processor(s) **226** are further connected to the Master Table **102** and to the Client Tables **132**. The databases and tables shown in FIG. 3 are preferably disk-resident, but with increased memory capacity for the database server or the routing processor, one or more of these databases could be converted by one skilled in the art to computer memory resident tables.

The VRU **214**, such as the preferred AT&T Intuity Conversant Information Response System, is the primary interface between the national telecommunications network **212** and the rest of the call center **213** with its CTI (Computer Telephone Integration) network. The VRU **214** interconnects the national telecommunications network **212** with the dual LAN **216**. The VRU **214** controls aspects of the call processing and routing processes. The VRU **214**, as part of the CTI network **200**, has the ability to control call processing and routing by:

- accepting the voice signal, ANI and DNIS from the telephone network;
- speaking recorded voice messages to the caller;
- translating caller key pad input DTMF into computer data codes;
- translating caller voice commands, such as "1,2,3, A,B,C, Yes and No", to computer data codes;
- translating computer text into synthesized speech and speaking it to the caller;
- communicating with other call center telephone and computer network systems and operators via communication protocols, such as ISDN, TCP/IP, Systems Network Architecture (SNA) Logical Unit (LU) 6.2, over a dual-wired Local Area Network (LAN);
- communicating by a SNA LU 6.2 gateway over dual-pair leased data lines to a remote database center located at ACXIOM in Conway, Ark.;

sending the required information back to the telecommunications network to connect the caller with a servicing location; and

writing out a call transaction record.

In addition to the VRU **214**, the following is a list of other components of the call center **213** with a description of their functionality:

SQL Database Server **218**

The Structured Query Language (SQL) Database server **218** connects to the call processing center LAN **216** and databases **100**, **132**, **134** and **236**, as previously mentioned. The primary function of the SQL Database server **218** is to store and retrieve all call transaction data as well as storing, maintaining, and retrieving data from more dynamic databases. Data retrieved by the SQL server **218** is utilized by the VRU **214**, for example, to provide information to one or more of the call processing recipients. The transaction data is maintained in the Call Transaction storage **236**, and is specific to the current call. The transaction data is used for any post-call processing that may occur, for billing, and for historical or record-keeping purposes. The other databases accessed by the SQL server **218** include databases **100** used during an Update, Validation and Classification process described in conjunction with FIG. **7**, and databases **132** and **134** for providing information to a call recipient. The preferred SQL Database server is available from Oracle Corporation running on a UNIX machine, such as an AT&T model 3600.

The transaction data is indexed by multiple indices including, but not limited to:

DNIS by caller provided telephone number

DNIS by Date and Time

DNIS by Service Location Telephone Number and by Date and by Time

DNIS by Service Location Telephone Number and by Caller Telephone Number

Caller provided telephone number by Date and Time

The transaction data includes, but is not limited to, the following:

text (driveable directions, servicing location name and address)

binary data (date, time, caller provided telephone number, ANI, DNIS, servicing location telephone number, operator or VRU handled call)

graphics (maps showing the caller location, the servicing location and the street network)

recorded voice (caller recorded name and address)

The dynamic databases include:

Bellcore NPANXX Split file **344** (FIG. **7**)

Bellcore LERG6 file **350** (FIG. **7**)

Bellcore V&H Coordinate file **356** (FIG. **7**)

DNIS dependent Customer files indexed by telephone number **362** (FIG. **7**)

Exceptions file indexed by telephone number **368** (FIG. **7**)

DNIS dependent Client Tables 132 (FIG. **3**)

DNIS dependent Client Locations Tables 134 (FIG. **3**)

CTI PBX/ACD **220** and Host **224**

The Private Branch Exchange/Automatic Call Distributor (PBX/ACD) **220** and the Host **224** both connect to the dual LAN **216**, and further, to the set of human operators **222**. The current preferred subsystem is the one currently utilized by AT&T American Transtech which includes an AT&T PBX/ACD **220**, an IBM Host **224** and AT&T CTI software. The primary function of these components is to provide the operators **222** with a means to communicate with the caller by voice and simultaneously communicate with the CTI network **200** via a video monitor, CRT, or other visual display device. The operators **222** are utilized during exceptions call handling, as will be described hereinbelow. The operators **222** are also utilized for semi-automated applications, such as the applications previously described above.

The subsystem provides the following operator functionality:

communicate via voice with the caller.

transfer the call to a servicing location using Transfer Connect.

enter a caller provided address and other application specific information on a CRT or other visual display connected to the Host **224**.

Spatial Key code the entered address using Group 1 software and ATI software that properly formats the last 8 digits of the Spatial Key.

determine the servicing locations by accessing the DNIS defined Client Table **132** and Client Locations Table **134** based on the caller's Spatial Key.

display information retrieved from the selected Servicing Location Table record on the CRT.

display information on the CRT retrieved from remote databases based on knowing the caller's Spatial Key or telephone number.

write out a call transaction record.

Customer Routing Processors (CRP) **226**

The Customer Routing processor **226** directly connects with the national telecommunications network **212** and with the dual LAN **216**. The CRP **226** further connects to the Client Tables **132** and the Master Table **102**. Based on the DNIS received from the network **212**, one of the plurality of Client Tables **132** is selected for use in processing by the CRP **226**. The preferred CRP **226** is a function of how it is connected to the CTI network **200**. If it is connected directly to an AT&T Long Distance Carrier (LDC) switch **504** (FIG. **5**), the preferred CRP **226** is a Sun "Spare 10" running under UNIX. If it is connected to the ATI LAN **216**, the preferred CRP **226** is an AT&T 3600 running UNIX. A single CRP **226** can contain multiple processors and each processor can support multiple clients.

The CRP **226** provides the information needed to either route and complete the telephone call or to facilitate a service location information request. The primary function of the CRP **226** is to accept a telephone number from the network **212** and return a Spatial Key by looking up the telephone number in the Master Table **102** and retrieving the Spatial Key. Alternatively, the routing processor **226** accepts both telephone number and a DNIS and return a list of Servicing location IDs with the distance from the caller provided telephone number location to the servicing location. The CRP **226** first looks up the telephone number in the Master Table **102** and retrieves the Spatial Key, and then looks up the retrieved Spatial Key in the DNIS dependent Client Table **132** and retrieves the Servicing location(s) information associated with the Spatial Key. The retrieved information is placed on the LAN **216** for access by the SQL server **218** to use in retrieving information from the Client Location tables **134**.

Internet Server 242

The Internet Server 242 interconnects the national telecommunications network 212 and the dual LAN 216. The preferred Internet server 242 is an AT&T 3600 computer running UNIX and ATI software. The Internet server 242 facilitates retrieval of call transaction data by one or more of the caller, the servicing location or the vanity advertiser. The primary function of the Internet Server 242 is to provide post call or call parallel access to call transaction data or data retrievable from call transaction data by the caller, the servicing location or the vanity advertiser. The use of the Internet server 242 in servicing each of the information recipients will now be described.

For the caller, the server software provides the ability for the caller to download or receive electronic mail information related to the selected servicing location, such as, but not limited to, the name, address, a map or directions from the caller's location to the servicing location, hours open and a menu. Once connected to the ATI Internet site over the line 210 (FIG. 2), the caller is asked to enter his or her telephone number and a vanity number to obtain the information requested during the call.

For the vanity advertiser connected to the Internet server 242, the server software provides the vanity advertiser the ability to download or receive by electronic mail, information related to a caller, such as, but not limited to, name, address, demographic data, and so forth, by entering the DNIS and the caller's telephone number. The above information may also be downloaded in a batch mode by entering the DNIS and a date/time range for selected servicing locations or all servicing locations.

For the servicing location, the server software provides the same download functionality over the line 244 (FIG. 2) as for the vanity advertiser. However, the service location can preferably only download, by file transfer, or receive, by electronic mail, call related data for its own location. The servicing location's electronic mail address is retrieved from the Client Service Locations file 134. In addition, for a service location with a CTI computer (such as location 248, FIG. 2), the Internet server 242 provides the access means for the servicing location to access caller telephone number and Spatial Key dependent data during the call.

FAX Server 238

The FAX Server 238 interconnects the national telecommunications network 212 and the dual LAN 216. The preferred FAX server 238 is an AT&T 3600 computer running UNIX with ATI FAX software. The FAX server 238 facilitates providing a way to provide printed information, such as a map or directions, to a call recipient. The primary function of the FAX server 238 is to send post call or call parallel Faxes to:

the caller, wherein the FAX contains service location information or directions to the servicing location.

the servicing location, wherein the FAX contains information about the caller or directions to the caller location.

The caller's FAX number is provided by the caller during the call to the VRU or the operator, and a FAX to the caller is sent over the line 210 (FIG. 2). Alternatively, the servicing location's FAX number is obtained from the Client Locations table 134 and a FAX to the servicing location is sent over the line 244. The information that is faxed is a function of the DNIS, the client application and the FAX recipient.

Modem Server 240

The Modem Server 240 interconnects the national telecommunications network 212 and the dual LAN 216. The preferred Modem server 240 is an AT&T 3600 computer running UNIX and ATI software. The Modem server 240 is similar to the Internet server 242 in terms of media, and similar to both the Internet Server and FAX Server 238 in terms of functionality. The Modem server 240 provides another way for obtaining call parallel or post call information through the call processing center 213. Because of the time required to connect with the call center 213, slow data transmission rates and the cost of connect time, the Modem server 240 is not currently practical for some applications. This could obviously change in the future.

Remote Database Processing Center 231 (FIG. 4)

Referring to FIG. 4, the Remote Database Processing Center 231 will now be described. The Mainfiame computer 232 at the remote processing center 231 is preferably connected to the call processing center LAN 216 over a set of dual-pair leased data lines by the SNA LU 6.2 gateway 230. The preferred remote database processing center 231 is operated by ACXIOM Corporation in Conway, Ark. ACXIOM acts as a data processing service bureau primarily using IBM mainframe computers 232 and Reduced Instruction Set Computing (RISC) UNIX processors 234 for several different Fortune 500 companies. ACXIOM currently provides real-time access or is in the process of establishing real-time access to all the remote databases shown in FIG. 4 and defined in detail in FIG. 1. They currently support high-speed lease-line computer access to several client databases. They are also the preferred processor to build and maintain the Master Table 102 that is housed in its production form at AT&T American Transtech Some of the remote databases shown in FIG. 4 could be stored at the Call Processing Center 213 or other locations remote to ACXIOM. The databases shown in FIG. 4 are preferably disk resident databases, but with increased memory capacity for the mainframe computer 232 or the migration to large memory 64 bit RISC computers like the DEC Alpha, one or more of these databases could be converted by one skilled in the art to computer memory resident tables.

National Telecommunications Network 212 (FIG. 5)

Referring to FIG. 5, the National Telecommunications Network 212 will be further described. As previously mentioned, there are two classes of vanity number calls. Class 1 telephone calls are calls where the final terminating location is a servicing location determined by intelligence outside the telecommunications network. Referring to FIG. 5, there are three separate architectures within Class 1 calls:

Architecture A uses a Customer Routing Processor (CRP) connected via a data link to the Long Distance Carrier (LDC) switch outside a Local Exchange Carrier (LEC). During call setup at the LDC, the ANI and DNIS are passed to a CRP that determines and returns the terminating POTS number. The call is then connected to the servicing location associated with the determined POTS number. This architecture is utilized in the prior art.

Architecture B is representative of a classical two call system. The first call is terminated at a VRU and the VRU determines the POTS number of the final destination and generates a second call from the VRU to the determined POTS number. It then patches the first and second call together so that the caller is connected to the servicing location. This architecture is also utilized in the prior art.

Architecture C, the preferred architecture for most present applications utilizes an advanced AT&T network feature called Transfer Connect or Post Answer Redirect. In this architecture, the call is first connected to the VRU through the LDC switch where the VRU determines the POTS number of the servicing location. The VRU sends this information to the LDC switch and the LDC switch drops the call link from the LDC switch to the VRU and connects the caller to the servicing location associated with the POTS number. There are three different implementations of Transfer Connect:

Blind Transfer: The call is transferred without knowing if the servicing location will answer or if servicing location's line is busy. This is the least costly implementation and the one illustrated in FIG. **5**.

Consult and Transfer: The call is connected between the VRU or operator and the servicing location before the VRU or operator drops out of the loop. This is the preferred implementation if the operator needs to consult with the servicing location before transferring the caller to the servicing location.

Conference and Transfer: This is a three party conference call that includes the caller, the VRU or the operator and the servicing location. This is the preferred implementation to announce the call to the servicing location when the telephone is answered and before the caller is connected, or if an exceptions handling operator needs to be involved in a 3-way conversation.

Class 2 telephone calls are calls where the final terminating location is the network terminating point of the vanity number. This is called architecture D, wherein the call terminates at the VRU. This is the preferred embodiment for applications that do not require connecting the caller to a servicing location.

In all four architectures, as illustrated in FIG. **5**, the typical call starts with a caller at a caller location, such as location **202**, dialing a vanity number. In FIG. **5**, all interprocess connectivity lines are labeled with one or more of the letters A,B,C,D indicating the architecture for which the connectivity applies. Note that the connectivity illustrated in FIG. **5** applies to voice calls. The use of the national telecommunications network **212** for computer (e.g., for Internet use) or fax connections is well known in the technology and will therefore not be described herein.

In architectures ABCD, the switch at a LEC1 **256** accepts the call over a line **264** from the caller location **202** and assigns an ANI (Automatic Number Identification) number that is independent of the telephone used. According to AT&T, over 98% of all switches currently assign and pass a 10 digit ANI number.

Next the call, ANI number, and DNIS (Dialed Number Identification Service) number are passed over a line **266** by LEC1 **256** to a switch for a Long Distance Carrier (LDC) **258**, such as AT&T, MCI or Sprint. The preferred carrier is AT&T.

In architecture A, the LDC **258** passes the ANI and DNIS over line a **268** to a CRP **226** located at a remote location and the CRP returns a servicing location telephone number.

In architectures BCD, the call is connected over lines B **270**, C **272** or D **274** to a terminating switch **260**. The terminating network switch **260** can be located at the LEC that services the call processing center housing the VRU **214** or the call processing center can be connected directly to the long distance network with an AT&T "MEGACOM 800" or AT&T "MULTIQuest 900" service. The preferred implementation in this CTI network **200** (FIG. **2**) is the direct connection to the AT&T long distance network using an AT&T 4 ESS switch with "MEGACOM 800" service located at AT&T American Transtech in Jacksonville, Fla.

In architectures BCD, the call is connected over lines B **278**, C **280** or D **276** to the VRU **214**, which can be connected to exceptions handling operators **222** as shown in FIG. **3** at the call processing center **213**.

In architectures BCD, the VRU **214** passes an ANI or caller provided telephone number and DNIS to the CRP **226** on a line **282**. The routing processor **226** sends a servicing location information packet containing the servicing location telephone number to the VRU **214** on line **282**. At this point architecture D is complete from a telecommunications network connectivity perspective.

In architecture B, the VRU **214** opens a second port and dials the servicing location telephone number on a line **284** through the switch **260**.

In architecture C, the VRU **214** notifies the switch **260** via an information packet on a data line **286** that it wants to transfer the call on the incoming line **280** to the servicing location number contained in the information packet. Connection **280** is then dropped between the VRU **214** and the switch **260**.

In architecture B, the switch **260** connects the second call on a line **288** to the LDC switch **258** and passes along the service location telephone number.

In architecture C, the switch **260** notifies the LDC **258** that it wants to transfer the call to the POTS number contained in the information packet by sending an information packet on a line **290**. Connection line **272** is then dropped between the switch **260** and the LDC switch **258**.

In architectures ABC, the LDC **258** connects the call to a LEC3 **262** on a line **292**. In most cases LEC3 and LEC1 are the same LEC. LEC3 then connects the call over a line **294** to a servicing location, such as location **246** or **248**.

In FIG. **5**, the VRU **214** is shown outside the National Telecommunications Network **212** and is located at the call processing center **213** (FIG. **3**). Currently, the LDC portion of the network does support limited VRU capability with high capacity but restricted functionality VRUs called network prompters. In the future, with expansion of communications capabilities between the LDC **258** and the CRP **226** and the upgrading of the network VRU capabilities, the network VRU could assume all the responsibilities of the VRU **214** currently located at the call processing center **213**. This evolutionary process can also proceed one step further once the LEC can provide national long distance service and the network evolves into an Intelligent Network (IN) and then into an Advanced Intelligent Network (AIN). At this point, the LDC **258** could be eliminated and the VRU **214** and many of the responsibilities, if not all, of the call center **213** (and the remote database center **231** (FIG. **4**)) could be located at the LEC. The LEC could access the required virtual telephone number database, housed on a Service Control Point (SCP) computer (not shown), over the (AIN) signaling system #7 (SS7) network (not shown). Conceptually nothing will have changed other than changes in telecommunications laws and regulations which have created a more open system that makes more efficient network designs possible.

III. CALL CENTER CALL PROCESS 300

Referring primarily to FIG. 6 and also to FIG. 2, a process **300** shows an overview of the preferred Call Center Call process. However, other hybrids and variations of the system process could be employed by one skilled in the art to provide the same functionality. Process **300** and other processes described herein are executed by one or more of the processors on the CTI network **200**.

Process **300** (FIG. 6) begins with a caller, such as a caller at caller location **202**, dialing a vanity number. The call is processed by the national telecommunications network **212** (FIG. 2) and is answered by the VRU **214** at the call center **213**. The VRU **214** decodes the information packet passed by the network **212** and determines the ANI and DNIS as shown in state **302**.

Moving to a decision state **304**, process **300** provides a way for the caller to enter a first location telephone number other than the ANI of the telephone from which they are calling. This is used in applications such as sending flowers to, for example, the caller's mother for Mother's Day, where the caller wants to place an order with a florist that delivers to the location of their mother's telephone. Another exemplary application is when the caller wants information mailed to his/her home, but the call is from a work location. If this option is not selected at state **304**, then the first location telephone number is set to the ANI. If the optional telephone number input is selected at decision state **304**, function **306** is activated and the caller provides the new telephone number by key pad entry on a Touchtone telephone or other device providing DTMF data, or by speaking the number slowly to the VRU **214**.

After the first location telephone number is set to the ANI, or after the optional telephone number input at function **306**, process **300** advances to a Update, Validation, Classification and Screen process **308**. Process **308** updates, validates and classifies the first location telephone number passed through decision state **304** or from function **306**. Process **308** will be described in detail hereinbelow in conjunction with FIG. 7.

The information obtained in process **308** is examined at a decision state **310**. If the first location telephone number is invalid, the process **300** moves back to the top of decision state **304** to allow the caller to provide another telephone number. If the first location telephone number is a non-United States POTS number, such as a cellular number or a Canadian number, the call is sent to exception call handling at state **312**. If the first location telephone number is a valid US POTS number, the process **300** proceeds to a function **314**. The handling of invalid and non-US POTS numbers can vary by application.

At function **314**, the valid US POTS first location telephone number is looked up in Master Table **102**. If it is found, the matching Master Table record's Spatial Key is retrieved. If no Master Table record was found and retrieved, the call is routed to exception call handling at state **312** by a decision state **316**. Otherwise, the call proceeds to a decision state **318**.

If the application requires Spatial Key retrieved data related to the first location telephone number, decision state **318** calls a Retrieve and Verify process **320**. Process **320** retrieves and verifies caller Spatial Key dependent data and is described in detail in conjunction with FIG. **8**.

At the completion of process **320** or if decision state **318** evaluated to be false, process **300** proceeds to a decision state **322**. If process **320** was called and the return flag's value is "exceptions", the call is routed to exception call handling at state **312**. If the return flag value is "verified", or if decision state **318** evaluates false, the call continues on to an optional service locations decision state **324**.

At decision state **324**, if the application requires connecting the caller to a servicing location or providing the caller information regarding a servicing location(s), process **300** calls a Connect or Provide Information process **326**. A detailed description of providing caller servicing location(s) information and connecting the caller to a servicing location is illustrated and explained in detail in Applicant's previous patent application entitled "Automatic Information and Routing System for Telephonic Services", U.S. Ser. No. 08/598,392, which is hereby incorporated by reference.

At the completion of process **326** or if decision state **324** evaluated to be false, process **300** proceeds to a decision state **328**. At decision state **328**, process **300** either spawns a Parallel Call process **330** and ends at state **332**, or ends at state **332** without spawning parallel process **330**. Both determining whether to spawn a parallel process and which parallel process to spawn are a function of the application and caller provided information. For example, a particular application may spawn a parallel process to FAX a map to a caller's FAX machine based on the caller's request while the call is in progress. Process **330** is described in conjunction with FIG. **9** below.

Referring now to FIG. **7**, the process **308** (defined in FIG. **6**) of adding intelligence to the input telephone number by retrieving information from telephone number indexed databases during the call will be described. Before process **308** is executed, the caller provided telephone number goes through the following preliminary checks or edits. Checks are made to determine if the telephone number is 10 digits in length, each of the 10 digits is a number from 0 to 9, and the "Ns", i.e., the first and fourth digits, in the NPA-NXX-XXXX are 2 or greater. Of course, if the public telephone network is changed to use telephone numbers extended to a length greater than 10 digits, the checks and other system aspects will be modified to account for the new length.

To determine area code exchange changes, the preferred embodiment uses a NPANXX Split file **344**. This file provides the new NPANXX and its corresponding old NPANXX and the time period, called the permissive dialing period, in which both are active.

For determining the validity of a given telephone number, a LERG6 file **350** is preferred. LERG6 refers to one of the several LERG files. This file contains a record for each valid NPANXX, its current status, and for each block of line numbers, the switch to which this block of line numbers is assigned. If the input telephone number's NPANXX is not in this file, or the NPANXX is in the file but the line number is not currently assigned to a switch, the telephone number is an invalid telephone number at that point in time.

The preferred file for classifying a telephone number is a V&H Coordinate file **356**. For each valid NPANXX, this file contains the type of service provided, e.g., POTS, cellular, pager, and so forth; a dialable flag; V&H coordinates which can be converted to latitude and longitude; and country, state and city in which the NPANXX is located.

Client specific Customer databases **362** have been around for years and are DNIS dependent. These databases are used for special handling of preferred customers, problem customers or used to lookup a customer's last order in a pizza delivery application, for example. These databases are created and maintained to meet the specific needs of each client.

A negative list or inverse list can be a global list or DNIS dependent. If it is DNIS dependent, it is usually combined

with the Customer database described above. A negative list **368** is a list of phone numbers of customers and/or potential customers that have historically bounced checks, not paid their bills or have presented some other type of problem. Equifax maintains such a database of telephone numbers for a consortium of long distance carriers. Each carrier provides their list of problem customers and Equifax merges these into a master list that is used by the consortium members to identify potential customers that have been canceled by one carrier trying to sign up with another carrier.

FIG. **7** illustrates the preferred embodiment as five separate lookup, retrieval and validation functions in a single serial block. One skilled in the art could change the order, combine some of the databases together, or create five separate blocks for the same functionality. The databases in FIG. **7** are shown as disk resident databases, but since these databases are small in size, one or more of these databases could be converted by one skilled in the art to computer memory resident tables.

All the databases in FIG. **7** are preferably updated for NPANXX splits. The updates are incorporated in the Split file **344**, the LERG6 file **350** and the V&H Coordinate file **356** by Bellcore, and each record in these files is date coded as to when it goes into effect. The Customer databases **362** and the Negative database **368** are updated by a process similar to that shown by states **802** through **816** of FIG. **18A** for updating the Master Table for NPANXX splits.

The process **308** begins at a start block **340**. The edited telephone number and DNIS shown in state **342** are inherited by process **308** and used by function **346** in conjunction with the system date to look up the edited telephone number's NPANXX record in the NPANXX Split file **344**. If the record is found and it passes an effective date test, function **346** combines the new NPXNXX and the line number to create an updated telephone number **348**. If the record is not found or the record is found but the effective date has not occurred, function **346** moves the edited telephone number to the updated telephone number state **348**.

Proceeding to a validation function **352**, process **308** accepts the updated telephone number from state **348** and looks up the updated telephone number's NPANXX in the LERG6 file **350**. If the record is found and the updated telephone number's line number falls within a range of currently supported line numbers, then the valid phone number flag in state **354** is set to "yes". If the record is not found or the record is found but the updated telephone number's line number does not fall within a range of currently supported line numbers, the valid phone number flag is set to "no". If the flag in state **354** is set to "no", all following fields are set to blank characters by function **352** so they can be written out at state **372** by function **370**.

If the validity flag in state **354** is "yes", then function **358** accepts input from state **354** and retrieves the V&H coordinate record corresponding to the updated telephone number's NPANXX from the V&H Coordinate file **356**. The NPANXX is then classified by function **358**, and the result along with previously determined information is written to state **360**.

Continuing to a lookup function **364**, process **308** accepts input from state **360**. If the validity flag is "yes" and the DNIS corresponds to an on-line Customer database **362**, then the updated telephone number is looked up in the corresponding DNIS Customer database. If the record is found, then the customer data is retrieved. Function **364** then writes the customer data and previously retrieved data to "customer data" at state **366**. If the record is not found, the "customer data" is set to blank characters.

Advancing to a lookup function **370**, process **308** accepts input from state **366**. If the validity flag is "yes" and the Negative database **368** is present, function **370** then looks up the updated telephone number in the Negative database **368**. If the updated telephone number is found, then the corresponding data is retrieved. If the updated telephone number is not found, the Negative database data is set to blank characters. Function **370** then writes out all retrieved and determined information at state **372**. Process **308** completes and the information is returned at state **374**.

Referring to FIG. **8**, process **320** first identified in FIG. **6** will now be described. Process **320** begins at a start state **376** and has access to the first location's Spatial Key at state **378**. State **380** uses the Spatial Key from state **378** to retrieve application specific Spatial Key dependent data from a set of Spatial Key Indexed databases **382**. These are the Spatial Key Indexed Databases **106–134** shown in FIG. **1** and previously described in detail.

Moving to state **384**, process **320** uses the VRU **214** (FIG. **2**) to speak application dependent retrieved data to the caller for verification or additional input. Continuing to state **386**, process **320** provides the caller a way to verify the retrieved data spoken by the VRU at state **384** or to provide additional application specific input as requested by the VRU **214** at state **384**.

Proceeding to a decision state **388**, process **320** determines if the caller has responded properly to the VRU **214** and/or validated the retrieved Spatial Key dependent data. If the caller has not responded properly or has verified the retrieved data as being erroneous, an exception handling return code flag is set to "exception" and process **320** exits at state **390**. However, if it determined at decision state **388** that the caller has responded properly, the call proceeds to a decision state **392**.

At decision state **392**, process **320** determines if the application requires additional caller input or data verification. If additional caller input or verification is required, decision state **392** routes the call back to state **380**. If additional caller input or verification is not required, the call proceeds to state **394**.

Process **320** uses state **394** to write out the application and caller specific data to the Call Transaction Storage **236** (FIG. **3**) and set the return flag to "verified." Process **320** then exits at state **396** and returns to state **322** in process **300** (FIG. **6**).

Referring to FIG. **9**, the operation of the Call Parallel process **330** (defined in FIG. **6**) will now be described. FIG. **9** shows a preferred generic implementation of the Call Parallel process **330**. The primary function of the Call Parallel process is to provide call, caller, servicing location data and spatial relationship data between the location associated with the caller provided telephone number and the servicing location to the caller and/or serving location by a medium other than voice. A non-inclusive list of examples includes: faxed maps, directions, addresses, hours open, menus, computer files or computer software. Since the Call Parallel process **330** is broad in scope, using this information, one skilled in the art could develop a specific parallel application that is technically different, but accomplishes the above goal of providing call dependent information that is independent of the actual call connectivity by a means other than voice to the caller or servicing location.

Process **330** begins at a start state **502** and proceeds to state **504** where it retrieves call transaction data from the Call Transaction Storage **236** and application specific data from the Spatial Key Indexed Databases **382**. Advancing to state **506**, process **330** formats the data retrieved at state **504**.

The format of the data is a function of the application and the communication means. Once the data is formatted, the next step is to physically connect to the receiving party address. Since there is always the possibility of not being able to physically connect to the recipient address, a way of retrying needs to be incorporated into the system. Process **330** begins this retry process at state **508** by initializing the connect attempts count to zero by setting a variable T equal to zero.

Moving to state **510**, process **330** tries to establish a connection with the receiving party. The recipient address is a function of the communications means. A partial list of examples includes a FAX telephone number, a modem telephone number, an E-Mail address or an Internet address. Proceeding to state **512**, process **330** increments the connect attempts count, T=T+1.

Continuing at a decision state **514**, process **330** determines if a connection has been made with the recipient address. If the connection has not been established, process **330** proceeds to a decision state **516**. At decision state **516**, process **330** determines if the retry maximum count has been has been reached by testing if the value of T is greater than the application-dependent parameter RETRY_MAX. If T is not greater than RETRY_MAX, process **330** loops back to state **510**. However, if T is greater than RETRY_MAX, as determined at decision state **516**, process **330** proceeds to state **518**. At state **518**, process **330** writes a transaction to an error log and then proceeds to an end state **524**. The system examines the error log on a periodic basis, researches communication problems and takes appropriate action to correct the problem.

If process **300** determines at decision state **514** that a connection has been established at state **510**, the process proceeds to state **520** and begins transmitting the information. Upon completion of the transmission at state **520**, process **330** proceeds to a decision state **522** and determines if all the data was transmitted. If the transmission was complete, process **330** terminates at state **524**. If the transmission was not complete, as determined at decision state **522**, process **330** proceeds to decision state **516**. At decision state **516**, process **330** determines if the retry maximum count has been reached by testing if the value of T is greater than the application-dependent parameter RETRY_MAX. If the value of T is not greater than RETRY_MAX, process **330** loops back to state **510**. However, if T is greater than RETRY_MAX, as determined at decision state **516**, process **330** proceeds to state **518**, writes a transaction to the error log and then proceeds to end process state **524**.

IV. CASS CERTIFIED ADDRESS BUILD

Some call processing applications may require use of a CASS certified address, e.g., address lookup and verification by an operator taking a telephone order. Referring now to FIG. **10**, the use of two USPS databases by a process **540** for building a CASS certified address from a Spatial Key will be explained.

The process **540** to build a CASS certified address begins at a start state **542** and moves to a state **544**. At state **544**, process **540** indexes the first five digits of the Spatial Key into a USPS City State File **430** and retrieves the preferred last line name (City Name) and State at state **546**. Moving to state **548**, process **540** indexes the first nine digits (ZIP+4) of the Spatial Key into the ZIP+4 Address Coding Guide (ACG) **404**, and the ZIP+4 record is retrieved at state **550**. This record contains all the components required to build an address: street pre-direction, street name, street type, street post-direction and secondary address type. The pre-direction and post-direction refer to a compass direction, such as Northwest. The general rule for creating the street number at state **552** is to replace the last two digit of a starting primary address number (SPAN) from the ZIP+4 record with digits **10** and **11** from the Spatial Key and strip off any leading zeros from the starting primary address number.

Proceeding to a decision state **554**, a determination is made as to whether a secondary address number is required by the USPS ZIP+4 type retrieved from the ZIP+4 ACG **404**. If the ZIP+4 type is "F" for Firm or "H" for High-rise, a secondary address is generally required. If so required, process **540** moves to state **556** and obtains the secondary address from the last eight digits of the Spatial Key with any leading zeros stripped off. At the completion of processing the secondary address at state **556** or if the secondary address was not required, as determined at decision state **554**, final formatting of the address components is performed at state **558**. The final formatting is a function of the client application and the type of ZIP+4. Process **540** completes at end state **560**.

V. MASTER TABLE BUILD AND MAINTENANCE DESCRIPTION

The Master Table **102** (FIGS. **1**, **3**, **6**) is designed to be used by both regulated and non-regulated entities in the regulated telephone network, and therefore, none of the Master Table data call be customer provided network information. There are four separate processes to build and maintain the Master Table that will be described in conjunction with FIGS. **11A**, **11B**, **11C** and **11D**. These processes show that customer provided network information is not used in the Master Table.

The goal of the processes described in FIG. **11A** is to provide either a regulated or non-regulated data provider a way of taking data about customers and processing it through commercial software and reformatting the result using a reformatting program. This creates a file containing abstract verification records that can be shipped to an authorized, regulated processing center, such as ACXIOM Corporation in Conway, Ark. The purpose of the validation files is to verify the current linkage between a telephone number and a USPS address. The data providers are provided with the NPANXX Split file to make sure that all their telephone numbers are current. There are two types of verification records: "connects" and "disconnects". Many data providers can only provide "connect" records. The verification record contains the following data fields:

- Telephone Number 10 Characters
- Spatial Key 19 Characters
- Connect or Disconnect Date 8 Characters (YYYYMMDD)
- Data Provider Code 2 Characters
- ZIP+4 Coding Status 2 Characters
- Transaction Type 1 Character (C=Connect D=Disconnect)
- Entity Name 40 Characters (Business and Government records only)

The data provider code identifies the source of the customer data. One character of the ZIP+4 coding status identifies the type of address, e.g., post office box, rural route, high-rise building, general delivery and so forth. The other character of the ZIP+4 coding status identifies how the ZIP+4 code was matched and is potentially used to identify or rectify an incorrect record at a later time. The entity name is required for business and government records. For con-

sumer records, the entity name can be a building name or set to blank characters. In cases where the customer moves and keeps their current telephone number, it is preferred that both a connect and disconnect record are generated.

Referring now to FIG. **11A**, a Coding process **402** uses commercial address standardization and DPC coding software, such as AccuMail® or CODE-1®, available from Group 1 Software, Inc. This software takes input from a database **400** provided by a data provider or client and uses the commercial software's version of the USPS ZIP+4 address coding guide **404** to address standardize and DPC or ZIP+6 code the customer record's address. It then appends the DPC and the ZIP+4 coding status to the customer record and writes the result to a ZIP+6 coded file **406**.

A Create Abstract Records process **408** reads the ZIP+6 coded records from file **406** and reformats the record to the record layout shown above. It also reads the NPANXX Split file **344** into memory and if necessary, based on the date, changes the NPANXX. It then writes the resultant reformatted record to a Data Provider Verification file Tape (or other storage media) **412** to be shipped to the processing facility.

FIG. **11B** illustrates the processing at a certified, regulated data processing facility, such as ACXIOM, that uses a Data Provider Verification file to link telephone numbers from the LERG file with Addresses and DPC codes from the USPS address coding guide. The resultant file contains telephone numbers from LERG, a telephone number type code from the V&H file, address and DPC codes from the USPS and processing codes and dates provided by the data providers.

Referring now to FIG. **11B**, a Sort, Match and Append process **422** starts by reading a record from the LERG file **350** and generating a list of phone numbers that are potentially connected to a terminating location from a LEC switch for all blocks of line numbers that are connected to a LEC switch(s) within the current LERG NPANXX. It then reads a record from the Data Provider Verification file **412** that has been sorted by telephone number. If the records match (thereby only valid telephone numbers are taken from the LERG file), the type of telephone code (e.g., POTS, cellular, pager, marine, and so forth) is retrieved from the V&H file **356** and a new record is generated containing the LERG telephone number, the V&H type of telephone code and all data provider data (including the Spatial Key) except the telephone number. The resultant new record is written to an Intermediate file **426**. If a telephone number is on the Data Provider Verification file **412**, but not on the LERG file **350**, it is written to the Invalid Telephone Number file **424**. Telephone numbers on the LERG file **350** that are not on the Data Provider Verification file **412** are skipped. This process is continued until all records on both files have been read and compared. The process **422** is further described in conjunction with FIG. **12** hereinbelow.

Proceeding to a Sort, Expand, Match and Append process **432** (FIG. **11B**), process **432** is very similar to process **422** in function, but uses a slightly different technique. Process **432** utilizes the Intermediate file **426** generated by process **422** (FIG. **12**), and the USPS City State file **430** and ZIP+4 file **404** to generate an address and a new Spatial Key, both of which are written to a Data Provider Verified Linkage Update (DPVLU) database **436**. Process **432** is further described in conjunction with FIGS. **17A** and **17B** hereinbelow.

Referring now to FIG. **11C**, two processes **440** and **444**, which comprise the Master Table Update preprocess, will be described. The Data Provider Verified Linkage Update database **436** that is generated by process **432** (FIG. **11B**) is used as one of the inputs to a Verify and Append DSF Information process **440**. The process **440** validates the addresses constructed in process **432** (FIG. **11B**) against a USPS Delivery Sequence File (DSF) **438**. The DSF file **438** is only licensed by the USPS to selected processing centers, such as ACXIOM, and the file can only be used to verify existing addresses. It differs from the ZIP+4 address coding guide **404** (FIGS. **11A** and **11B**) in that the coding guide provides only an address range for each ZIP+4, such as 101 to 199 Main St. In the DSF **438**, there is one record for each USPS deliverable address, such as 125, 151, or 175 Main St. In this example, the other potential odd numbered addresses within the ZIP+4 address coding guide address range do not exist. Matching against the DSF file also provides the ability to append a delivery type code.

A Determine Overlap process **444** provides the ability to determine if the location corresponding to a telephone number and the associated USPS address cannot be physically located at the same physical location. If the USPS address is a P.O. Box, Rural Route (RR) or General Delivery, it is obvious that the telephone number does not terminate at the address because the address is not a physical address. However, since the database is multi-sourced, some of the street, high-rise and firm addresses provided are billing addresses, not physical addresses. In routing and delivery applications, such as pizza delivery, it is critical to identify telephone numbers with Spatial Keys associated with a "foreign" physical location, such as a billing address. ACXIOM has created a file using a variety of databases that identifies which NPANXXs and 5 digit ZIP codes spatially overlap. If the update record's NPANXX-ZZZZZ (where the ZZZZZ represents a 5 digit ZIP code) is indexed in this file and there is no record found, then the NPANXX and the ZZZZZ do not spatially overlap. If NPANXX-ZZZZZ is found on the ACXIOM file, then the telephone number and ZIP Code are spatially proximate within a 2.5 mile error range. However, it is still not 100 percent certain that the telephone number and USPS address are located together. To solve this problem, applications that require 100% reliability must be designed to give the caller the ability to verify the address associated with the telephone number. An application having this ability was previously described above.

Referring now to FIG. **11C**, the operation of the processes **440** and **444** will be described. The Verify and Append DSF Information process **440** reads and matches records from the Data Provider Verified Linkage Update database **436** and the USPS DSF file **438**. If the data provider record matches the DSF file, then a DSF match flag is set to "yes" and the address delivery type code field is set to the value retrieved from the DSF file. If the data provider record does not match the DSF file, the DSF match flag is set to "no" and the delivery type code field is set to blank characters. All records from the Data Provider database **436** are reformatted and written to a DSF Verified database **442**. At this point in the process, the entity or building, address, city and state fields are no longer required.

Proceeding to the Determine Overlap process **444**, the process **444** starts by reading the DSF Verified database **442** and looking up the resultant record's NPANXX-ZZZZZ on the ACXIOM NPANXX To ZIP5 Overlap file **446**. If the record is found, then an Overlap Flag is set to "yes", or else if the record is not found, the Overlap Flag is set to "no". All records are then written to a Data Provider Updates with LERG Phone Number and USPS Spatial Keys database **448** which comprises an update feed into a Master Table Update process **456**.

FIG. **11D** illustrates the Master Table Update process **456**. There are three independent update steps or subprocesses

required to keep the Master Table updated. The first step is the updating of telephone numbers based on changes in numbers administered by Bellcore. The second step is due to changes in Spatial Keys based on ZIP Code changes by the USPS. The third step concerns changes due to the connecting and disconnecting of telephone numbers with addresses based on consumers and businesses moving and adding or dropping existing telephone numbers or lines. The Master Table Update process **456** will be further described in conjunction with FIGS. **18A, 18B** and **18C** hereinbelow.

As was described above, the records in the Master Table **102/454** do not contain customer provided network information. The origin of the customer telephone number, address, and Spatial Key is not from the data provider file **400** or data provider tape **412**. Only the data provider file connected/disconnected status and dates (first connect, disconnect, last verified) are utilized in the Master Table. The other Master Table information is from Bellcore, USPS, ACXIOM or generated by the Master Table build process.

Referring to FIG. **12**, the Sort, Match and Append process **422**, previously defineda in FIG. **11B**, will now be further described. Process **422** utilizes the Bellcore LERG file **350** of valid telephone numbers, the Bellcore V&H Coordinate file **356**, and a sorted version (by telephone number) of the Data Provider Verification file **412** created by process **408** (FIG. **11A**) as inputs. Process **422** generates new records and writes them to the Intermediate file **426** or writes invalid telephone numbers from the Data Provider Verification file **412** to the Invalid Telephone Number file **424**.

Beginning at a start state **602**, process **422** moves to state **604** wherein a variable lerg_eof is set to zero and a variable dpv_eof is set to zero. These variables will be used to check for end of file conditions below. Proceeding to a Read LERG File function **606**, process **422** reads the LERG file and returns either with a list of phone numbers along with a number of records in the list and a V&H file telephone type, or with the variable lerg_eof set to one if the end of the LERG file has been reached. Function **606** will be further described in conjunction with FIG. **13** hereinbelow.

Proceeding to state **608**, process **422** accesses the list returned from function **606** (LERG_LIST) at the first 10 digit telephone number entry on the list, wherein an index K=1. Advancing to a Read Data Provider Verification (DPV) File function **610**, process **422** reads a record in the sorted DPV file **412** and returns either with the DPV record, or with the variable dpv_eof set to one if the end of the DPV file has been reached.

Continuing at a decision state **612**, process **422** compares the LERG 10 digit telephone number at LERG_LIST(K) to the 10 digit telephone number (DPV_TELE#) returned from function **610**. If the telephone numbers are equal, process **422** moves to state **614** to generate a new record based on the telephone number from the LERG file **350**, the telephone type from the V&H file **356** and all DPV file data other than the telephone number. Moving to state **616**, the new record is written to the Intermediate file **426**. Continuing at a Increment LERG_LIST function **618**, process **422** increments the index variable K and either accesses the next entry in the current LERG_LIST or reads the next entry in the LERG file **350** to generate a new LERG_ LIST indexed at K=1. Function **618** will be further described in conjunction with FIG. **15** hereinbelow. Returning from the function **618** at a decision state **620**, process **422** determines if the variable lerg_ eof was set to one during function **618**. If the end of LERG file condition is true, process **422** proceeds to the Read DPV File function **610** to read the next record in the DPV file **412**.

If the end of the LERG file has not been reached, as determined at decision state **620**, process **422** also continues to function **610** to read the next record in the DPV file **412**. At the completion of function **610**, process **422** determines if the end of the DPV file has been reached at a decision state **622**. If so, because there are no further records to evaluate in the DPV file **412**, process **422** finishes at an end state **624**. However, if the end of the DPV file has not been reached, as determined at decision state **622**, process **422** moves back to decision state **612** to compare the new current LERG_LIST entry to the new current DPV record.

If process **422** determines that the LERG_ LIST entry at index K is greater than the DPV_TELE# at decision state **612**, execution continues at a function **630** for writing the DPV file telephone number to the Invalid Telephone Number (ITN) file **424**. Function **630** will be further described in conjunction with FIG. **16** hereinbelow.

At the completion of function **630**, process **422** moves to the Read DPV File function **610** to read the next record in the DPV file **412**. Proceeding to a decision state **632**, process **422** determines if the end of the DPV file **412** has reached. If so, process **422** is finished and moves to end state **624**. If the end of the DPV file **412** has not been reached, process **422** moves back to decision state **612** to compare the current LERG_LIST entry to the new current DPV record.

If process **422** determines, at decision state **612**, that the DPV_ TELE# is greater than the LERG_LIST entry at index K, execution continues at the Increment LERG_LIST function **618**. Function **618** will be further described in conjunction with FIG. **15** below. At the completion of function **618**, process **422** moves to a decision state **634**, to determine if the end of the LERG file **350** was reached. If the end of the LERG file has not been reached, process **422** moves back to decision state **612** to compare the new current LERG_LIST entry to the current DPV record. However, if the end of LERG file condition is true, as determined at decision state **634**, process **422** proceeds to the Read DPV File function **610** to read the next record in the DPV file **412**. Proceeding to a decision state **636**, process **422** determines if the end of the DPV file **412** has been reached. If so, because there are no further records to evaluate in the DPV file **412**, process **422** finishes at the end state **624**. However, if the end of the DPV file **412** has not been reached, process **422** continues at the function **630** to write the telephone number from the DPV file record to the ITN file **424**. At the completion of function **630**, process **422** moves back to the Read DPV File function **610**, as illustrated in FIG. **12**. This loop of function **610**, decision state **636** and function **630** continues until the end of the DPV file **412** is reached and process **422** finishes at the end state **624**.

Referring now to FIG. **13**, the Read LERG File function **606**, defined in process **422** (FIG. **12**), will be described. Function **606** reads the LERG file **350** and returns either with a list of phone numbers, or with an indication that the end of the LERG file has been reached.

The Read LERG File Function **606** begins at a start state **650** and moves to state **652** to read a record in the LERG file **350**. Associated with the NPANXX of the LERG record is a set of line numbers. Proceeding to a decision state **654**, function **606** determines if the end of the LERG file **350** has been reached. If so, the variable lerg_eof is set to one and function **606** returns at state **656** to process **422** (FIG. **12**). If the end of the LERG file **350** has not been reached, as determined at decision state **654**, function **606** advances to state **658**. At state **658**, the NPANXX of the LERG file record is used to check the V&H file **356** and retrieve a type of telephone code, e.g., cellular telephone type. The type of

telephone presently is identified by the NPANXX of the 10 digit telephone number.

Proceeding to state **660**, function **606** generates a list (LERG_LIST) of 10 digit telephone numbers having the NPANXX of the LERG record read in state **652**. This results in a list of up to 10,000 telephone numbers with the potential of being connected from the LEC switch(s) to a terminating location like a household or business. The telephone type determined in state **658** is assigned to each telephone number in the list. Moving to state **662**, the LERG_LIST index variable "K" is set to an initial value of one to point to the first telephone number in the list. A variable Kmax is set to the number of telephone numbers in the LERG_LIST. At the completion of state **662**, function **606** returns with the list of phone numbers along with the V&H file telephone type, K, and Kmax to process **422** (FIG. **12**) at a return state **664**.

Referring now to FIG. **14**, the Read DPV File function **610**, defined in process **422** (FIG. **12**), will be described. Function **610** begins at a start state **670** and moves to state **672** to read a record in the Data Provider Verification (DPV) file **412**. Proceeding to a decision state **674**, function **610** determines if the end of the DPV file has been reached. If so, the variable dpv_eof is set to one and function **610** returns at state **676** to process **422** (FIG. **12**). If the end of the DPV file **412** has not been reached, as determined at decision state **674**, function **610** returns with the DPV record to process **422** at a return state **678**.

Referring now to FIG. **15**, the Increment LERG_LIST function **618**, defined in process **422** (FIG. **12**), will be described. Function **618** increments the index variable K and either accesses the next entry in the current LERG_LIST or reads the next entry in the LERG file **350** to generate a new LERG_LIST.

Beginning at a start state **690**, function **618** moves to state **692** and increments the index variable K by one. Continuing at a decision state **694**, function **618** determines if the index variable K is greater than Kmax, the number of telephone numbers in the current LERG_LIST. If not, function **618** proceeds to state **700** and accesses the telephone number and telephone number type in the LERG_LIST at the index K (where K is from state **692** if K is less than or equal to Kmax, as determined at state **694**). Function **618** returns at state **702** to process **422** (FIG. **12**) with the telephone number and telephone number type.

Returning to decision state **694**, if K is greater than Kmax, function **618** proceeds to call the Read LERG File function **606** to read the next record in the LERG file **350** and generate a new LERG_LIST indexed at K=1. Function **606** has been previously described above. At the completion of function **606**, function **618** proceeds to a decision state **696** to determine if the end of the LERG file **350** has been reached. If so, function **618** returns with an end of file designation at a state **698** to process **422** (FIG. **12**). If the end of the LERG file has not been reached, as determined at decision state **696**, function **618** continues to state **700** and accesses the telephone number and telephone number type in the LERG_LIST at the index K (where K is from function **606** if K was greater than Kmax, as determined at state **694**). Function **618** returns at state **702** to process **422** (FIG. **12**) with the telephone number and telephone number type.

Referring now to FIG. **16**, the Write Invalid Telephone Number (ITN) File function **630**, defined in process **422** (FIG. **12**), will be described. Function **630** begins at a start state **710** and moves to state **712** to write a record with the same format as the DPV record to the ITN file **424**. Proceeding to a return state **714**, function **630** returns to process **422** (FIG. **12**).

Referring to FIGS. **17A** and **17B**, the Sort, Expand, Match and Append process **432**, previously defined in FIG. **11B**, will now be further described. Process **432** utilizes the Intermediate file **426** generated by process **422** (FIG. **12**).

Process **432** begins at a start state **730** and moves to a state **732** to sort the Intermediate file **426** by ZIP+6 and create a sorted Intermediate file **426'**. Moving to state **734**, process **432** reads a record from the sorted Intermediate file **426'** and then indexes the 5 digit ZIP Code against the USPS City State file **430** at state **736**. Proceeding to a decision state **738**, process **432** determines if the 5 digit ZIP Code is found in the City State file **430**. If the 5 digit ZIP Code is found, then the City State data is retrieved at state **742**. If the 5 digit ZIP Code is not found, as determined at decision state **738**, process **432** moves to state **740** and the record from the sorted Intermediate file **426'** is written to the Invalid ZIP Code file **434**. At the completion of state **740**, process **432** moves back to state **734** and the next record is read from the sorted Intermediate file **426'**.

After retrieving the city state record at state **742**, process **432** moves to state **744** and the ZIP+4 from the sorted Intermediate file **426'** is indexed against the USPS ZIP+4 file **404**. Proceeding to a decision state **746**, process **432** determines if the ZIP+4 record is found in the ZIP+4 file **404**. If so, process **432** moves to state **748** and the ZIP+4 record is retrieved from file **404** and the ZIP+4 data is written to a Data Provider Verified Linkage Update database **436** at state **750**. If the ZIP+4 record is not found in the ZIP+4 file **404**, process **432** proceeds to state **740** wherein the record is written to the Invalid ZIP Code file **434** and then the next record is read from the sorted Intermediate file **426'** at state **734**.

After retrieving the ZIP+4 record at state **748** and writing the ZIP+4 to the DPVLU database at state **750**, process **432** moves to state **752** and accesses the ZIP+6 from the sorted Intermediate file record (obtained at state **734**). Proceeding to state **754**, process **432** compares the last two digits of the ZIP+6 from the sorted Intermediate file **426'** against the primary address range of the ZIP+4 record from file **404**. Proceeding through an off-page connector A **755** to a decision state **756** (FIG. **17B**), process **432** determines if the building number falls in the primary address range and generates a unique address. If so, process **432** moves to state **760** wherein a USPS address is constructed from the ZIP+4 record and the valid ZIP+6 flag is set to "yes". If the building number does not fall in the primary address range and generate a unique address, as determined at decision state **756**, process **432** continues at state **758** wherein the valid ZIP+6 flag is set to "no" and the address is set to blank characters. At the completion of state **758**, process **432** proceeds through an off-page connector B **759** to state **734** (FIG. **17A**) wherein the next record is read from the sorted Intermediate file **426'**.

At the completion of state **760**, process **432** moves to a decision state **762** to determine if the ZIP+4 record type is "H" for High-rise or "F" for Firm. If so, process **432** moves to state **764** wherein the last eight digits of the 19 digit Spatial Key from the sorted Intermediate file **426'** are processed through an editing and reformatting process utilizing the following edits and reformats:

- All lower case letters are set to upper case; for example "3a" is set to "3A".
- Any special characters, except "/" when it is both preceded and followed by a number are eliminated; for example, "3-B" is set to "3B" while "½" is left unchanged.
- All special character strings, such as APT, STE, FLR, and so forth, are eliminated; for example, "APT B" is set to "B".

All numeric fields are right justified and filled with leading zeros; for example, "123" is set to "00000123".

Fields containing a letter, such as "B" or a "/", are left justified and filled with trailing blank characters; for example, "B123" is set to "B123".

A blank character is inserted prior to the first number preceding a "/"; for example "B31/2" is set to "B3 ½".

At the completion of the edit and reformat state **764**, process **432** continues at state **766** wherein a list of secondary addresses is created from the secondary address range retrieved from the ZIP+4 record. The secondary address is similar to the primary address in that there is a range. For example, if the range is 1 to 100, a list of 100 potential secondary addresses are generated. If the range is not a straight numeric, such as 3A to 3N, then secondary addresses 3A, 3B, . . . 3N are generated. In most situations where the secondary address is complex, such as 3B ½, the range or span on the ZIP+4 file is 3B ½ to 3B ½.

Proceeding to state **768**, process **432** compares the edited and reformatted eight character string one record at a time to the list of secondary addresses created at state **766**. Advancing to a decision state **770**, process **432** determines if the eight character string matches one of the list records. If the string matches a list record, process **432** moves to state **772** wherein the secondary address is extracted from the list and the secondary address match flag is set to "yes." If the secondary address does not match, as determined at decision state **770**, process **432** proceeds to state **774** wherein the secondary address match flag is set to "no" and the secondary address is set to blank characters.

At the completion of processing the secondary address and the match flag at state **772** or **774**, or if decision state **762** evaluates to be false, process **432** advances to state **776** wherein the resultant generated address and new Spatial Key are written to the Data Provider Verified Linkage Update database **436**. This database contains phone numbers from the LERG file **350**; type codes from the V&H file **356**; address, city, state, Spatial Key and Codes from the USPS files **404** and **430**; and dates and processing codes from the Data Provider Verification file **412**. After writing the DPVLU database **436** at state **776**, process **432** advances to a decision state **778** to determine if all records in the sorted Intermediate file **426'** have been processed. If not, process **432** proceeds through the off-page connector B **759** to state **734** (FIG. 17A) wherein the next record is read from the sorted Intermediate file **426'**. However, if all records in the sorted Intermediate file **426'** have been processed, process **432** finishes at an end state **780**.

Referring to FIGS. **18A**, **18B** and **18C**, the Master Table Update process **456**, previously defined in FIG. **11D**, will now be further described. This is a three step process that first updates the telephone numbers and the Spatial Keys in a current Master Table **454** before updating it with time-synchronized transactions. The current Master Table **454** and an Updated Master Table **458** are working copies (as described below) of the Master Table **102** shown in FIGS. **1** and **3**. Upon completion of process **456**, the Current Master Table **454** is not needed and becomes the Master Table **102**.

Prior to the Master Table Update process **456**, the Master Table has the following record structure:

Field	Size	Source
Telephone number	10 Characters	Bellcore
Spatial Key	19 Characters	USPS
Status (connected or disconnected)	1 Character	Data provider
First Contact Date	8 Characters	Data provider
Last Verified Date	8 Characters	Data Provider
Disconnect Date	8 Characters	Data Provider
Data Provider Code	2 Characters	Assigned
NXX Type	2 Characters	Bellcore
Point Identification	1 Character	Bellcore
ZIP+4 Type	1 Character	USPS
Secondary Address Unit Type	1 Character	USPS
ZIP+6 Unique Match Flag	1 Character	Assigned
Secondary Address Match Flag	1 Character	Assigned
Matched LSF Flag	1 Character	Assigned
DSF Delivery Type Code	1 Character	USPS
NPANXX-ZZZZZ Overlap Flag	1 Character	ACXIOM

A step **1** of process **456** (FIG. **18A**) updates telephone numbers based on changes in numbers administered by Bellcore. Beginning at a start state **801**, process **456** moves to state **802** and reads a record from the Current Master Table **454**. Moving to state **804**, process **456** looks up the Master Table NPANXX in the Bellcore NPANXX Split file **344**. Continuing to a decision state **806**, process **456** determines if the NPANXX is found in the Split file **344** and the split date is prior or equal to the update date. If so, process **456** advances to state **810** wherein the Current Master Table NPANXX field is updated with the new NPANXX. If the NPANXX is not found in the Split file **344** or the NPANXX is found on the split file but the split date is after the update date, process **456** proceeds to state **808** to indicate that the Current Master Table NPANXX field is left unchanged. At the completion of updating the NPANXX field at state **810** or if the record is left unchanged at state **808**, process **456** moves to state **812** wherein the Current Master Table record is written to the Updated Master Table **458**. This process (states **802** through **812**) is repeated until all records in the Current Master Table **454** have been read and processed as determined at a decision state **814**. When all records in the Current Master Table **454** have been read and processed, process **456** moves to state **816** wherein the Updated Master Table **458** is re-indexed and becomes the Current Master Table **454**. Process **456** then proceeds through an off-page connector A **817** to state **818** (FIG. **18B**).

A step **2** of process **456** (FIG. **18B**) accounts for changes in Spatial Keys based on ZIP Code changes by the USPS. Starting at state **818**, process **456** reads a record from the Current Master Table **454**. Proceeding to state **820**, process **456** looks up the Master Table record's ZIP+4 in an enhanced USPS ZIPMOVE file **452**. The ZIPMOVE file **452** includes ZIP Code changes by the USPS for ZIP+4 codes that have been moved and that have also had a change in finance number or last line name(city). The USPS ZIP+4 Move file is enhanced with ZIP+4 moves that have not changed either finance number or last line name by extracting a list of ZIP+4s that have changed in the current month from the USPS ZIP+4 Change file. All records with these ZIP+4s are extracted from the current Master Table, and USPS addresses are generated from the last month's USPS ZIP+4 address coding guide as described in process **540** (FIG. **10**). This address file is then DPC coded using USPS CASS certified address coding software. The old DPC code and the new DPC codes are then compared and if they are different, these records are merged with the USPS ZIP+4 Move file. This new reformatted and deduped file is called the Enhanced ZIP Move file, which contains both ZIP+4 and DPC or ZIP+6 moves. DPC moves occur when a ZIP+4 does not change but, for example, an old building with the ZIP+4

is torn down and replaced with a new high-rise that requires its own ZIP+4.

Continuing at a decision state **822**, process **456** determines if the ZIP+4 is found in the enhanced ZIPMOVE file **452** and the ZIP+4 move is applicable to the Current Master Table record DPC. If the ZIP+4 is found in the ZIPMOVE file **452**, process **456** advances to state **826** wherein the Current Master Table ZIP+4 and ZIP+4 Type Fields are updated with the new ZIP+4 and ZIP+4 Type. If the ZIP+4 is not found in the ZIPMOVE file **452** or the ZIP+4 is found but is not applicable to the Current Master Table record DPC, as determined at decision state **822**, the Current Master Table record is left unchanged. At the completion of updating the ZIP+4 and ZIP+4 type fields at state **826** or if the record is left unchanged at state **824**, process **456** moves to state **828** wherein the Current Master Table record is written to the Updated Master Table **458**. This process (states **818** through **828**) is repeated until all records in the Current Master Table **454** have been read and processed as determined at a decision state **830**. When all records in the Current Master Table **454** have been read and processed, process **456** moves to state **832** wherein the Updated Master Table **458** is copied to the Current Master Table **454**. Process **456** then proceeds through an off-page connector B **833** to state **834** (FIG. **18C**).

A step **3** of process **456** (FIG. **18C**) concerns changes due to the connecting and disconnecting of telephone numbers with addresses based on consumers and businesses moving and adding or dropping existing telephone numbers or lines. Starting at state **834**, process **456** initializes a variable mt_eof to zero, a variable dpu_eof to zero, and a variable old_dpt_rec to null (" "). The first two of these variables will be used to check for end of file conditions below. Variable old_dpu_rec is used to track the previous read of the Data Provider Updates (DPU) database **448**, and is initially set to null before the first read of the database **448**. Proceeding to a Read DPU Database function **836**, process **456** reads the DPU database and returns either with a DPU record, which includes a 10 digit telephone number, or with the variable dpu_eof set to one if the end of the DPU database **448** has been reached. The DPU database **448** is indexed by 10 digit telephone number in ascending order. Function **836** will be further described in conjunction with FIG. **19** hereinbelow.

Proceeding to a Read Master Table (MT) function **838**, process **456** reads a record in the Master Table **454** and returns either with the MT record, which includes a 10 digit telephone number, or with the variable mt_eof set to one if the end of the MT **454** has been reached. The Master Table **454** is indexed by 10 digit telephone number in ascending order. Function **838** will be further described in conjunction with FIG. **20** hereinbelow. After reading both the DPU database **448** and the MT **454**, process **456** continues at a decision state **840** and compares the 10 digit telephone number field of the Master Table **454** against the 10 digit telephone number field of the DPU database **448**. If the telephone numbers are equal, process **456** moves to state **842** to update the current MT record in memory from the dates, codes and sources of the one or more DPU records obtained from the last execution of the Read DPU function **836**. Proceeding to a decision state **844**, process **456** examines the updated record in memory to determine if a "Disconnect" transaction type indicator is active in the record. If the "Disconnect" indicator is not active, process **456** continues at a Write to Updated Master Table function **846**, wherein the updated record is written to the Updated Master Table **458**. The Write to Updated Master Table function **846** is shown in FIG. **21**. At the completion of the write at function **846** or if the "Disconnect" indicator is active, as determined at decision state **844**, process **456** continues at the Read DPU Database function **836**, previously described above, to get the next one or more records (having a new 10 digit telephone number) from the DPU database **448**. If the "Disconnect" indicator is active (decision state **844**), the updated current MT record in memory is effectively deleted by not writing the record to the Updated Master Table **458** (function **846**). Process **456** then proceeds to the Read Master Table function **838**, previously described above, to get the next record from the MT **454**. Moving to a decision state **850**, process **456** determines if the variable mt_eof is set to one, which indicates that the end of the MT **454** has been reached.

If the end of the Master Table **454** has been reached, as determined at decision state **850**, process **456** advances to a decision state **852** to determine if the variable dpu_eof is set to one, which indicates that the end of the DPU database **448** has been reached. If so, process **456** moves to state **854** wherein the Updated Master Table **458** is copied to the Current Master Table **454**. Process **456** completes at an end state **856**.

However, if the end of the DPU database **448** has not been reached, as determined at decision state **852**, or alternatively, if the 10 digit telephone from the Master Table record is greater than the 10 digit telephone number from the DPU database (as determined at decision state **840**), process **456** continues at state **860**. At state **860**, process **456** creates a Master Table record in memory from the one or more DPU database records obtained during the last execution of the Read DPU function **836**. The DPU database **448** may have multiple records for a particular 10 digit telephone number. Each of these records has a date associated with the record data that is used to determine the most current data to use at state **860**. For example, a early first DPU record may have a "Disconnect" indicator which would lead to deleting the record, but a later second DPU record indicates a "Connect" for the 10 digit telephone number, thus effectively negating the "Disconnect" from the first DPU record. Proceeding to a decision state **862**, process **456** examines the created MT record in memory to determine if the "Disconnect" indicator is active in the record. If the "Disconnect" indicator is not active, process **456** continues at the Write to Updated Master Table function **846**, wherein the created MT record is written to the Updated Master Table **458**. The Write to Updated Master Table function **846** is shown in FIG. **21**. At the completion of the write at function **846** or if the "Disconnect" indicator is active, as determined at decision state **862**, process **456** continues at the Read DPU Database function **836**, previously described above, to get the next one or more records (having a new 10 digit telephone number) from the DPU database **448**. If the "Disconnect" indicator is active (decision state **862**), the created MT record in memory is effectively deleted by not writing the record to the Updated Master Table **458** (function **846**). Continuing at decision state **850**, process **456** determines if the end of the Master Table **454** has been reached.

If the end of the Master Table **454** has not been reached, as determined at decision state **850**, process **456** advances to a decision state **864** to determine if the variable dpu_eof is set to one, which indicates that the end of the DPU database **448** has been reached. If the end of the DPU database **448** has been reached, or alternatively, if the 10 digit telephone from the Master Table record is less than the 10 digit telephone number from the DPU database (as determined at decision state **840**), process **456** moves to state **866**. At state

866, the current Master Table record in memory is not changed but is passed on to the Write to Updated Master Table function 846, wherein the current MT record is written to the Updated Master Table 458. The Write to Updated Master Table function 846 is shown in FIG. 21. At the completion of the write at function 846, process 456 continues at the Read Master Table function 838, previously described above, to get the next record (having a new 10 digit telephone number) from the Master Table 454. Process 456 continues at the decision state 850 as previously described. Returning to decision state 864, if the end of the DPU database 448 has not been reached, process 456 loops back to the decision state 840 (previously described) to determine the relationship between the current 10 digit telephone from the Master Table record and the current 10 digit telephone number from the DPU database.

Referring now to FIG. 19, the Read Data Provider Updates (DPU) Database function 836 will be further described. The Read DPU Database function 836 was previously defined in FIG. 18C. The DPU database 448 is indexed by 10 digit telephone numbers in ascending order.

Beginning at a start state 880, function 836 moves to a decision state 882 to determine if the variable old_dpu_rec is equal to null. If so, this indicates that this is the first call of function 836 and the first record in the Data Provider Updates database 448 is read at state 884. Proceeding to state 886, function 836 moves the DPU record read at state 884 into variable old_dpu_rec. At the completion of state 886, or if the variable old_dpu_rec was not equal to null at decision state 882 (indicating that this is not the first read of the DPU database), function 836 moves to state 888 and set a variable K equal to one. Continuing at state 890, function 836 moves the DPU record in old_dpu_rec into a list dpu_list at an address K of the list. Advancing to state 892, function 836 reads the next record in the DPU database 448 and checks for the end of the DPU database at a decision state 894. If the end of the database is reached, function 836 proceeds to state 896, sets the variable dpu_eof equal to one and returns at state 898 to process 456 (FIG. 18C).

If the end of the DPU database 448 is not reached, as determined at decision state 894, function 836 proceeds to a decision state 900. At decision state 900, function 836 determines if the 10 digit telephone number of the DPU record just read is equal to the 10 digit telephone number of the DPU record stored at address one of the dpu_list (from state 890). If so, this indicates that two consecutive DPU records have the same telephone number but likely have different data in the other fields of the record. In this situation, function 836 advances to state 902 and increments the address variable K by one. Continuing at state 904, function 836 moves the current DPU record (from state 892) into the dpu_list at the incremented address K (state 902). Function 836 then loops back to state 892 to read the next record in the DPU database 448. If this new record also has the same 10 digit telephone number as the 10 digit telephone number of the record previously stored at address one of dpu_list, the new record will be added into dpu_list at the next address K. This loop (states 892, 894, 900, 902 and 904) continues until the 10 digit telephone number of the next DPU record does not equal the 10 digit telephone number of the record previously stored at address one of dpu_list, as determined at decision state 900. When this happens, function 836 moves to state 906 and the new current DPU record read at state 892 is moved into old dpu_rec. Function 836 then returns at state 898 with one or more records saved in the dpu_list to process 456 (FIG. 18C). During any one call of function 836, the number of records returned in the dpu_list is equal to the number of DPU database records having the same 10 digit telephone number.

Referring now to FIG. 20, the Read Master Table function 838 will be further described. The Read Master Table function 838 was previously defined in FIG. 18C. The Master Table 454 is indexed by 10 digit telephone numbers in ascending order. Beginning at a start state 920, function 838 moves to state 922 and reads a record in the Master Table 454. As is well known in database technology, the first call of function 838 by process 456 (FIG. 18C) will read the first MT record, and subsequent calls of function 838 will read the next record after the record read from a previous call of the function. Proceeding to a decision state 924, function 838 determines if the end of the Master Table 454 is reached. If so, function 838 moves to state 926 and sets the variable mt_eof equal to one to signify the end of file condition. At the completion of state 926, or if it is determined that the end of file was not reached at decision state 924, function 838 returns at state 928 to process 456 (FIG. 18C).

Referring now to FIG. 21, the Write to Updated Master Table function 846, defined in process 456 (FIG. 18C), will be described. Function 846 begins at a start state 930 and moves to state 932 to write a Master Table record to the Updated Master Table 458. Proceeding to a return state 934, function 846 returns to process 456 (FIG. 18C).

In the preferred implementation, the Master Table 102/454 only contains the single most current record for each telephone number with the exception of businesses. For businesses, it is sometimes necessary to keep both a mailing address, such as a PO Box, and a physical address Spatial Key. It would be obvious to one skilled in the art that the Master Table Update process 456 could be modified to write disconnected telephone numbers to create a historical Master Table with multiple records for each telephone number.

While the above detailed description has shown, described, and pointed out the fundamental novel features of the invention as applied to various embodiments, it will be understood that various omissions and substitutions and changes in the form and details of the system illustrated may be made by those skilled in the art, without departing from the spirit of the invention.

What is claimed is:

1. In a Computer Telephone Integration (CTI) network, a call processing system, comprising:

a master table of telephone numbers with spatial keys;

means for capturing a first location telephone number;

means for validating the captured telephone number;

means for indexing the validated first location telephone number into the master table to retrieve the spatial key of the first location's telephone number;

means for indexing the retrieved spatial key into at least one spatial key indexed database to retrieve, by spatial key linkage, information associated with the telephone number of the first location; and

means for communicating the retrieved information associated with the telephone number of the first location to at least one recipient selected from a vanity number advertiser, a caller or a servicing location.

2. The system defined in claim 1, wherein the means for communicating the retrieved information provides a service to the recipient, the service comprising providing a selected servicing location telephone number to the network for automatically connecting the caller to the selected servicing location.

3. The system defined in claim 1, wherein the means for communicating the retrieved information provides a service to the recipient, the service comprising:

determining that the caller requires operator assistance; and

providing information required by the network to connect the caller to a vanity advertiser operator.

4. The system defined in claim 1, wherein the means for communicating the retrieved information provides a service to the recipient, the service comprising providing an informational item.

5. The system defined in claim 4, wherein the informational item comprises a caller provided telephone number; a dialed number identification service (DNIS) number; an automatic number identification (ANI) number; a caller ID number; a spatial key of a caller/network provided telephone number; a list of one or more locations servicing the caller with a name and address of the servicing location and a distance to the location; days and hours of operation for one or more servicing locations; United States Postal Service (USPS) coding accuracy support system (CASS) certified address of the caller/network provided telephone number; latitude and longitude associated with the caller/network provided telephone number; latitude and longitude associated with the servicing location address; driveable directions from a location of the caller/network provided telephone number to a servicing location; driveable directions from a servicing location to a location of the caller/network provided telephone number; a map showing the location of the caller/network provided telephone number, the servicing location and a street network between the location of the caller/network provided telephone number and the servicing location; micro directions for the servicing location; servicing location daily specials; servicing location product availability, information and pricing; servicing location special events and start times; household information associated with the caller/network provided telephone number; individual information associated with the caller/network provided telephone number; business location information associated with the caller/network provided telephone number; government location information associated with the caller/network provided telephone number; business financial information associated with the caller/network provided telephone number; geographic information associated with the caller/network provided telephone number; property information associated with the caller/network provided telephone number; or vanity advertiser product announcements and promotions.

6. The system defined in claim 1, wherein the means for capturing a first location telephone number comprises a module for receiving network provided call information.

7. The system defined in claim 6, wherein the module for receiving network provided call information captures a number selected from an automatic number identification (ANI) number, a caller ID number, or a dialed number identification service (DNIS) number.

8. The system defined in claim 1, wherein the means for capturing a first location telephone number comprises:

means for producing a prompt signal to invite a caller to provide input to the call processing system; and

means for receiving said caller input.

9. The system defined in claim 8, wherein the means for producing a prompt signal comprises a voice response unit (VRU) utilizing a prompt comprising a recorded voice, computer synthesized text to speech, a message displayed on a videophone, or a live operator.

10. The system defined in claim 8, wherein the means for receiving said caller input comprises a Voice Response Unit (VRU) utilizing a recognition method selected from voice recognition or Dual Tone Multi-Frequency (DTMF) recognition.

11. The system defined in claim 8, wherein the means for receiving said caller input comprises a live operator, and wherein said live operator enters the input to the call processing system via a keyed input device.

12. The system defined in claim 1, wherein the spatial key is selected from a 19 digit ZIP Code, a 10 digit telephone number, a 15 digit census block number, an interleaved latitude and longitude coordinate pair, or a derived coordinate pair from latitude and longitude.

13. The system defined in claim 1, wherein the spatial key indexed database comprises a database selected from a spatial database, a geographic database, a United States Postal Service (USPS) address database, a household database, a individual database linked to a household database, a business locations database, a business financial database linked to a business locations database, a government locations database, a property database, a client table, or a service locations table linked to a client table.

14. The system defined in claim 1, wherein the means for communicating the retrieved information to at least one recipient comprises a during call communications process, a post call communications process, or a call parallel communications process.

15. The system defined in claim 14, wherein the during call communications process is configured to utilize a message type comprising a pre-recorded voice message received by a telephone, a synthesized text-to-speech voice received by a telephone, an operator voice received by a telephone after an operator obtains information from a CTI network visual display, text displayed on a videophone, a map displayed on a videophone, a picture displayed on a videophone, or information stored for post call retrieval.

16. The system defined in claim 14, wherein the post call communications process is configured to utilize a message type comprising a pre-recorded voice message received by a telephone, a synthesized text-to-speech voice received by a telephone, an operator voice received by a telephone after an operator obtains information from a CTI network visual display, text displayed on a videophone, a map displayed on a videophone, a picture displayed on a videophone, a facsimile, an E-mail, a mailing to a United States Postal Service (USPS) address, or a computer with a visual display connected to the CTI network.

17. The system defined in claim 14, wherein the call parallel communications process is configured to utilize a message type selected from a facsimile, an E-mail, or a computer with a visual display connected to the CTI network.

18. The system defined in claim 17, wherein the computer is connected to the CTI network by a connection type comprising a dedicated point-to-point connection, a dial-up modem connection to a CTI network modem server, or an Internet connection to a CTI Internet server.

19. In a Computer Telephone Integration (CTI) network, a method of call processing comprising the steps of:

capturing a telephone number associated with a first location;

indexing the captured telephone number into a master table of telephone numbers and associated spatial keys;

retrieving the spatial key of the indexed telephone number;

indexing the retrieved spatial key into at least one spatial key indexed database;

retrieving, by spatial key linkage, information associated with the telephone number; and

communicating the retrieved information associated with the telephone number to at least one call recipient that comprises a vanity number advertiser, a caller or a servicing location.

20. The method defined in claim **19**, additionally comprising the step of validating the captured telephone number.

21. The method defined in claim **20**, wherein the step of validating the captured telephone number comprises the steps of:

comparing a NPANXX portion of the captured telephone number against an area code split file; and

updating the NPANXX portion of the captured telephone number with a new NPANXX from the split file.

22. The method defined in claim **20**, wherein the step of validating the captured telephone number comprises the steps of:

indexing a NPANXX portion of the captured telephone number against a local exchange routing guide (LERG) file; and

determining the validity of the captured telephone number using the information in the LERG file.

23. The method defined in claim **20**, wherein the step of validating the captured telephone number comprises the steps of:

comparing a NPANXX portion of the captured telephone number against a V&H coordinate file; and

determining a type of the NPANXX and a location corresponding to the NPANXX.

24. The method defined in claim **20**, wherein the step of validating the captured telephone number comprises the steps of:

determining whether the telephone number includes a specified number of digits; and

determining whether selected digits of the telephone number have values present in valid telephone numbers.

25. The method defined in claim **24**, wherein the step of determining whether selected digits of the telephone number have values present in valid telephone numbers comprises the steps of:

determining whether the second, third, and fifth through tenth digits each have a value between zero through nine inclusive; and

determining whether each of the first digit and the fourth digit has a value between two through nine inclusive.

26. The method defined in claim **19**, wherein the step of communicating the retrieved information to at least one call recipient comprises the steps of:

determining a selected servicing location telephone number;

providing the servicing location telephone number to the network; and

automatically connecting the caller to the selected servicing location.

27. The method defined in claim **19**, wherein the step of communicating the retrieved information to at least one call recipient comprises the steps of:

determining that the caller requires operator assistance; and

providing the network with the information required to connect the caller to a vanity advertiser operator.

28. The method defined in claim **19**, wherein the step of capturing the telephone number comprises the steps of:

producing a prompt signal to invite a caller to provide input; and

receiving said caller input.

29. The method defined in claim **19**, wherein the step of capturing the telephone number comprises the step of recognizing voice input.

30. The method defined in claim **19**, wherein the spatial key comprises a 19 digit ZIP Code.

31. The method defined in claim **19**, wherein the spatial key indexed database comprises a spatial database, a geographic database, a USPS address database, a household database, an individual database linked to a household database, a business locations database, a business financial database linked to a business locations database, a government locations database, a property database, a client table, or a service locations table linked to a client table.

32. In a Computer Telephone Integration (CTI) network, a method of generating a master telephone number to spatial key database including a plurality of records, one of the records comprising a telephone number, a spatial key, and information related to the telephone number and the spatial key, the method comprising the steps of:

providing a master database of telephone numbers including a plurality of records, one of the records comprising a telephone number;

utilizing a data provider verification file, said file having a plurality of records, wherein one of the records comprises a telephone number, a spatial key, and related data;

identifying a record from the master database of telephone numbers having a telephone number that matches a telephone number in a record of the data provider verification file;

appending a spatial key and related data from the data provider verification file to the matching record of the master database of telephone numbers, thereby generating an intermediate database;

providing a master database of spatial keys, comprising a plurality of records, one of the records comprising a spatial key;

comparing a record from the intermediate database to records of the master database of spatial keys to identify a spatial key match; and

appending the telephone number and the data provider related data from the record of the intermediate database to the matching record of the master spatial key database, wherein the resultant record does not include the telephone number and the spatial key from the data provider verification file.

33. The method defined in claim **32**, wherein the related data comprises a linkage item, said linkage item indicative of a linkage between the telephone number and the spatial key.

34. The method defined in claim **33**, wherein the linkage item comprises a connected status code.

35. The method defined in claim **33**, wherein the linkage item comprises a disconnected status code.

36. The method defined in claim **32**, additionally comprising the step of updating one telephone number to spatial key linkage item in the master telephone number to spatial key database based on a change in the data provider verification file.

37. The method defined in claim **36**, wherein the change in the data provider verification file is one of a plurality of changes made necessary by consumers and businesses moving, and thereby disconnecting and connecting telephone numbers.

38. The method defined in claim **36**, wherein the change in the data provider verification file is one of a plurality of changes made necessary by a caller initially calling a service provider.

39. The method defined in claim 32, wherein the spatial key comprises a 19 digit ZIP Code.

40. The method defined in claim 32, wherein the master database of telephone numbers is generated using a local exchange routing guide (LERG) file.

41. The method defined in claim 32, wherein the master database of telephone numbers is generated using a V&H Coordinate file.

42. The method defined in claim 32, wherein the master spatial key database is generated using a United States Postal Service delivery sequence file (DSF).

43. The method defined in claim 32, wherein the master spatial key database is generated using a United States Postal Service ZIP+4 file.

44. The method defined in claim 32, wherein an official nation-wide administrator is the source of the telephone numbers in the master telephone number to spatial key database.

45. The method defined in claim 32, wherein a United States Postal Service is the source of the spatial key in the master telephone number to spatial key database.

46. The method defined in claim 32, additionally comprising the step of assigning a spatial key to a record of the data provider verification file using United States Postal Service coding accuracy support system (CASS) certified software.

47. The method defined in claim 32, additionally comprising the step of updating a telephone number of the data provider verification file using a NPANXX split file.

48. The method defined in claim 32, additionally comprising the step of updating a telephone number in the master telephone number to spatial key database based on changes in telephone numbers maintained by a nation-wide administrator.

49. The method defined in claim 32, additionally comprising the step of updating a spatial key in the master telephone number to spatial key database based on ZIP Code changes by a United States Postal Service.

50. In a Computer Telephone Integration (CTI) network, a method of call processing comprising the steps of:

capturing a first location telephone number during a call;

validating the captured telephone number;

indexing the validated telephone number into a master table of telephone numbers and associated spatial keys;

transferring the call to an exceptions handling operator if the validated number is not present in the master table;

obtaining an address associated with the validated telephone number;

assigning a spatial key for the address;

connecting the call to a service location based on the spatial key and a dialed telephone number; and

storing the validated telephone number and the spatial key.

51. The method defined in claim 50, additionally comprising the steps of:

indexing the spatial key into at least one spatial key indexed database; and

retrieving, by spatial keey linkage, information to connect the call.

52. The method defined in claim 50, additionally comprising the step of updating the master table by use of the stored validated telephone number and the spatial key.

53. The method defined in claim 50, additionally comprising the step of displaying the validated telephone number and the dialed telephone number to the operator.

54. The method defined in claim 50, additionally comprising the step of requesting the address associated with the validated telephone number.

55. The method defined in claim 50, additionally comprising the step of standardizing the address.

56. The method defined in claim 55, additionally comprising the step of validating the standardized address.

57. The method defined in claim 50, wherein the step of connecting the call comprises the steps of:

retrieving a list of service locations, each service location having an associated telephone number; and

selecting one of the service locations from the list.

58. In a Computer Telephone Integration (CTI) network, a method of maintaining a call processing master table, comprising the steps of:

capturing a first location telephone number during a call;

validating the captured telephone number;

indexing the validated telephone number into a master table of telephone numbers and associated spatial keys;

transferring the call to an exceptions handling operator if the validated number is not present in the master table;

obtaining an address associated with the validated telephone number;

assigning a spatial key for the address;

storing the validated telephone number and the spatial key; and

updating the master table by use of the stored validated telephone number and the spatial key.

* * * * *

United States Patent [19]

Riskin

[11] **Patent Number: 4,757,267**

[45] **Date of Patent: Jul. 12, 1988**

[54] **TELEPHONE SYSTEM FOR CONNECTING A CUSTOMER TO A SUPPLIER OF GOODS**

[75] Inventor: **Bernard N. Riskin, Lambertville, N.J.**

[73] Assignee: **Applied Telematics, Inc., Wayne, Pa.**

[21] Appl. No.: **64,127**

[22] Filed: **Jun. 17, 1987**

[51] **Int. Cl.**[4] **H04M 3/42**

[52] **U.S. Cl.** **379/113**; 379/201; 379/219

[58] **Field of Search** 379/113, 114, 115, 133, 379/134, 201, 211, 212, 219, 220, 221

[56] **References Cited**

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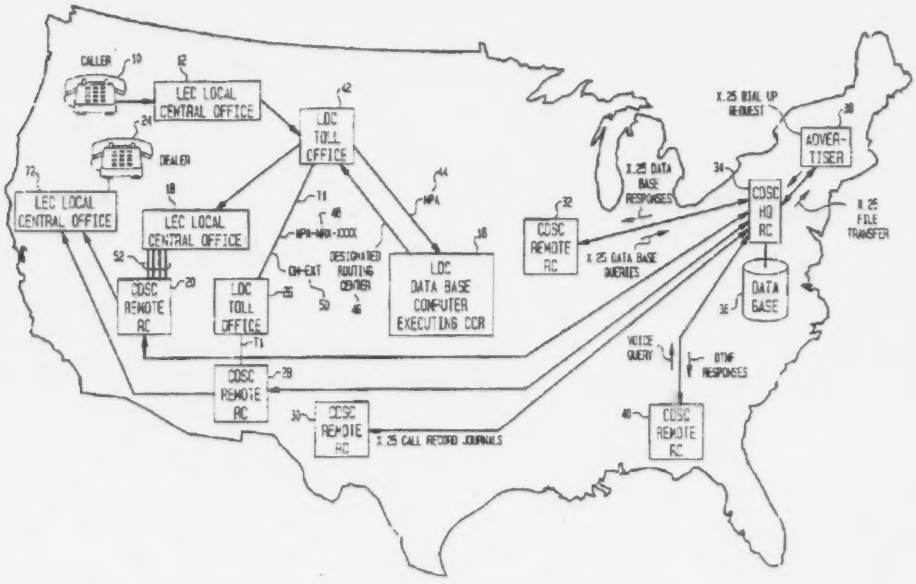
4,608,460	8/1986	Carter et al.	179/6.11

Primary Examiner—Stafford D. Schreyer
Attorney, Agent, or Firm—Richard C. Woodbridge

[57] **ABSTRACT**

A telephone system automatically connects a potential customer with a nearby dealer who can provide the goods or services desired by the potential customer. The potential customer first dials an "800"-type number which preferably includes digits uniquely characteristic of the product or service desired. The system identifies the originating telephone number of the potential customer and a computer initially routes the call to a specific customer dealer service company (CDSC) office in the general vicinity of the potential customer. The specially equipped CDSC HQ office includes a vertical-horizontal (V-H) file listing each dealer by product/service and equivalent of longitude/latitude. A comparison is performed between the telephone number of the potential customer and the data in the V-H file to find 1-3 selected dealers nearby to the potential customer. The system then automatically dials the telephone number of the closest dealer thereby routing the potential customer directly to a nearby dealer who can provide the products or services of interest to that customer. If the dealer's telephone number is busy or does not answer, the system can attempt to call another nearby dealer if one exists. The system also provides for billing the telephone call and for reporting each call in detail to the advertiser.

42 Claims, 14 Drawing Sheets



US005588048A

United States Patent [19]

Neville

[11] Patent Number: 5,588,048

[45] Date of Patent: Dec. 24, 1996

[54] **GEOGRAPHICALLY MAPPED TELEPHONE ROUTING METHOD AND SYSTEM**

[75] Inventor: **Daniel E. Neville**, Orlando, Fla.

[73] Assignee: **800 Adept, Inc.**, Altamonte Springs, Fla.

[21] Appl. No.: **623,051**

[22] Filed: **Mar. 28, 1996**

Related U.S. Application Data

[63] Continuation of Ser. No. 389,547, Feb. 15, 1995, abandoned, which is a continuation of Ser. No. 922,793, Jul. 31, 1992, abandoned.

[51] **Int. Cl.**[6] **H04M 3/42**

[52] **U.S. Cl.** **379/127**; 379/201; 379/207; 379/211; 379/220

[58] **Field of Search** 379/201, 207, 379/209, 210, 211, 212, 221, 97, 265, 266, 94, 88, 89, 67, 127, 142, 220, 230, 58, 59, 60, 219

[56] **References Cited**

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5,136,636	8/1992	Wegrzynowicz	379/207
5,311,572	5/1994	Friedes et al.	379/89
5,329,578	7/1994	Brennan et al.	379/89

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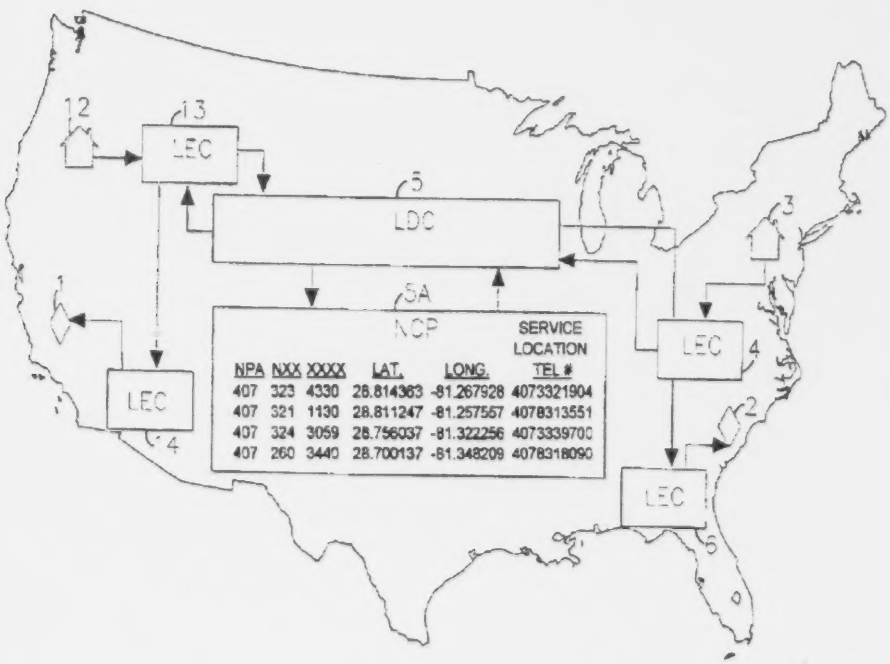
Tiger Technical Guide, pp. 3–5, Oct., 1991.

Primary Examiner—Krista A. Zele
Assistant Examiner—Scott Wolinsky
Attorney, Agent, or Firm—Edward M. Livingston, Esq.

[57] **ABSTRACT**

A method and system for direct routing of telephone calls made by a caller originating from within specific calling areas to one of a plurality of locations of a second party according to certain criteria established by the second party. This routing is accomplished based on the assignment of latitude and longitude coordinates to a potential caller's location. Once these coordinates are assigned to each of the potential callers, the second party's criteria is applied to assign the potential caller to a second party. Such criteria could be existence within a previously-defined geographic area, a custom defined geographic area, or through calculations such as the shortest distance between coordinate points. Once all such assignments have been made, a database is assembled to be used by a long distance carrier for direct routing of telephone calls from callers to an assigned second party.

16 Claims, 9 Drawing Sheets



US005805689A

United States Patent [19]

Neville

[11] Patent Number: 5,805,689

[45] Date of Patent: Sep. 8, 1998

[54] **GEOGRAPHICALLY MAPPED TELEPHONE ROUTING METHOD AND SYSTEM**

[75] Inventor: **Daniel E. Neville**, Orlando, Fla.

[73] Assignee: **800 Adept, Inc.**, Altamonte Springs, Fla.

[21] Appl. No.: **709,475**

[22] Filed: **Sep. 5, 1996**

Related U.S. Application Data

[62] Division of Ser. No. 623,051, Mar. 28, 1996, Pat. No. 5,588,048, which is a continuation of Ser. No. 389,547, Feb. 15, 1995, abandoned, which is a continuation of Ser. No. 922,793, Jul. 31, 1992, abandoned.

[51] **Int. Cl.**[6] **H04M 3/42**

[52] **U.S. Cl.** **379/220**; 379/201; 379/207; 379/211

[58] **Field of Search** 379/201, 207, 379/211, 212, 219, 220, 221

[56] **References Cited**

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4,797,818	1/1989	Cotter	379/93.12
4,924,510	5/1990	Le	379/201
4,954,958	9/1990	Savage et al.	379/207
5,001,710	3/1991	Gawrys et al.	379/201
5,018,191	5/1991	Catron et al.	379/211
5,023,904	6/1991	Kaplan et al.	379/201
5,029,196	7/1991	Morganstein	379/211
5,033,079	7/1991	Catron et al.	379/127
5,095,505	3/1992	Finucane et al.	379/201
5,136,636	8/1992	Wegrzynowicz	379/207
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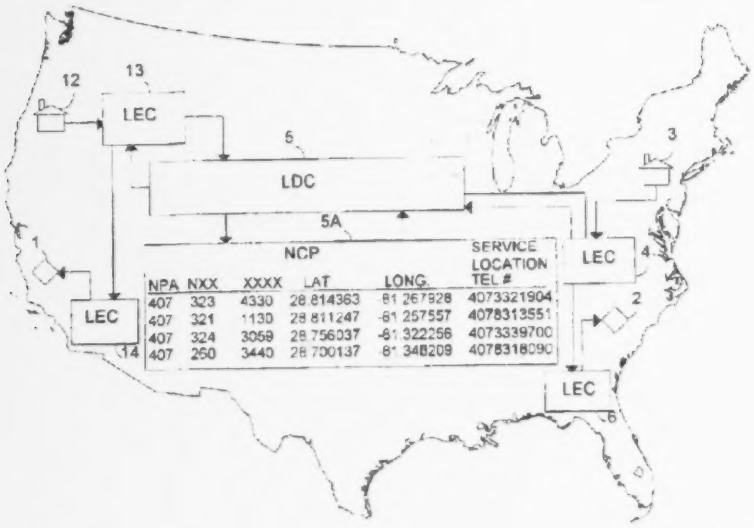
Primary Examiner—Krista Zele
Assistant Examiner—Scott Wolinsky
Attorney, Agent, or Firm—Edward M. Livingston, Esq.

[57] **ABSTRACT**

A method and system for direct routing of telephone calls made by a caller originating from within specific calling areas to one of a plurality of locations of a second party according to certain criteria established by the second party. This routing is accomplished based on the assignment of latitude and longitude coordinates to a potential caller's location. Once these coordinates are assigned to each of the potential callers, the second party's criteria is applied to assign the potential caller to a second party. Such criteria could be existence within a previously-defined geographic area, a custom defined geographic area, or through calculations such as the shortest distance between coordinate points. Once all such assignments have been made, a database is assembled to be used by a long distance carrier for direct routing of telephone calls from callers to an assigned second party.

6 Claims, 9 Drawing Sheets



US005907608A

United States Patent [19]

Shaffer et al.

[11] Patent Number: 5,907,608

[45] Date of Patent: May 25, 1999

[54] AUTOMATIC ROUTING AND INFORMATION SYSTEM FOR TELEPHONIC SERVICES

[75] Inventors: James D. Shaffer, Rancho Sante Fe, Calif.; George G. Moore, Great Falls, Va.

[73] Assignee: Murex Securities, Ltd., Douglas, United Kingdom

[*] Notice: This patent is subject to a terminal disclaimer.

[21] Appl. No.: 09/099,821

[22] Filed: Jun. 19, 1998

Related U.S. Application Data

[63] Continuation of application No. 08/659,318, Jun. 6, 1996, which is a continuation-in-part of application No. 08/598,392, Feb. 8, 1996, Pat. No. 5,848,131, which is a continuation-in-part of application No. 08/365,325, Dec. 28, 1994, Pat. No. 5,506,897, which is a continuation of application No. 08/020,653, Feb. 22, 1993, abandoned.

[51] Int. Cl.[6] H04M 3/42

[52] U.S. Cl. 379/220; 379/207; 379/246

[58] Field of Search 379/220, 201, 379/207, 211, 221, 219, 127, 113, 115, 114, 245, 212, 246

[56] References Cited

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4,757,267	7/1988	Riskin	379/113
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Tiger Technical Guide, Oct. 1991, pp. 3–5, "Topological Integrated Geographic Encoding and Referencing System/Zone Improvement Plan.".

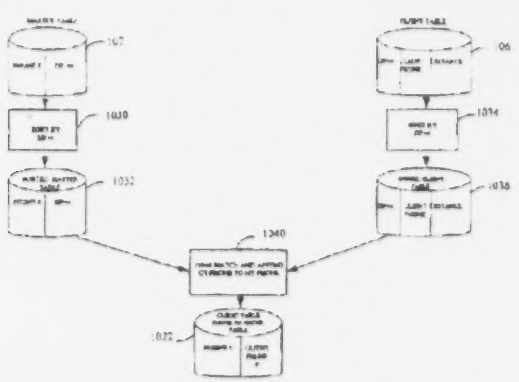
Primary Examiner—Scott Wolinsky

Attorney, Agent, or Firm—Knobbe, Martens, Olson & Bear, LLP

[57] ABSTRACT

A system and method for automatically and seamlessly routing telephone calls across a telephone network. The system includes a telephone network interface box having a computer, a master file and client file stored in the computer. The master file is dynamically linked to the client file at routing time to produce a selected client location telephone number which is transmitted across the telephone network. The system utilizes Automatic Number Identification to identify the calling party. The master file has a plurality of records having a telephone number and a spatial key and is updated frequently. The client file has a plurality of records having a spatial key and a client telephone number. Methods of generating client file records for both radius and polygon defined service areas through an automated computer process are included in the present invention. Another embodiment of the system merges the records of the client file with the records of the master table to generate a single table to create a one table system. The one table system increases speed of the call routing process. A second embodiment of the one table system is provided by a special case of the client file build process which yields a caller telephone number to service location telephone number file. A further embodiment provides real-time processing in situations where high call volumes and transaction processing speed are not a major issue. The real-time processing system is simple to update and requires minimal storage.

23 Claims, 44 Drawing Sheets



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US005910982A

United States Patent [19]

Shaffer et al.

[11] Patent Number: 5,910,982

[45] Date of Patent: Jun. 8, 1999

[54] **AUTOMATIC ROUTING AND INFORMATION SYSTEM FOR TELEPHONIC SERVICES**

[75] Inventors: **James D. Shaffer**, Rancho Santa Fe, Calif.; **George G. Moore**, Great Falls, Va.

[73] Assignee: **Murex Securities, Ltd.**, Douglas, United Kingdom

[21] Appl. No.: **09/100,305**

[22] Filed: **Jun. 19, 1998**

Related U.S. Application Data

[63] Continuation of application No. 08/659,318, Jun. 6, 1996, which is a continuation-in-part of application No. 08/598,392, Feb. 8, 1996, Pat. No. 5,848,131, which is a continuation-in-part of application No. 08/365,325, Dec. 28, 1994, Pat. No. 5,506,897, which is a continuation of application No. 08/020,653, Feb. 22, 1993, abandoned.

[51] **Int. Cl.**[6] **H04M 3/42**

[52] **U.S. Cl.** **379/220**, 379/207; 379/246

[58] **Field of Search** 379/220, 201, 379/207, 211, 221, 219, 127, 113, 115, 114, 212, 245, 246

[56] **References Cited**

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4,924,510	5/1990	Le	379/221
4,954,958	9/1990	Savage et al.	364/444
5,001,710	3/1991	Gawrys et al.	379/113
5,018,191	5/1991	Catron et al.	379/100
5,023,904	6/1991	Kaplan et al.	379/91
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5,033,079	7/1991	Catron et al.	379/100
5,095,505	3/1992	Finucane et al.	379/201
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Targus Information Corporation, brochure, Jan. 17, 1995, "DART Intelligent Call Processing.".

TIGER Technical Guide, Oct. 1991, pp. 3–5, "Topological Integrated Geographic Encoding and Referencing System/Zone Improvement Plan.".

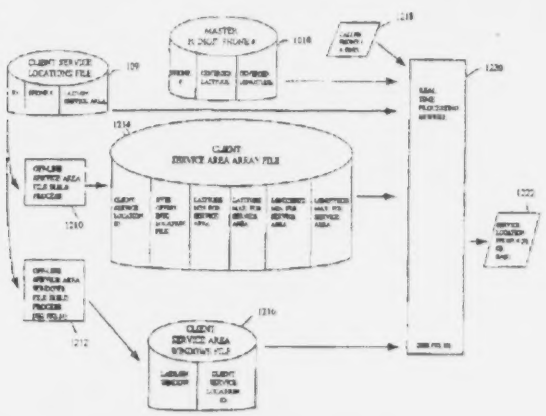
Primary Examiner—Scott Wolinsky

Attorney, Agent, or Firm—Knobbe, Martens, Olson & Bear, LLP

[57] **ABSTRACT**

A system and method for automatically and seamlessly routing telephone calls across a telephone network. The system includes a telephone network interface box having a computer, a master file and client file stored in the computer. The master file is dynamically linked to the client file at routing time to produce a selected client location telephone number which is transmitted across the telephone network. The system utilizes Automatic Number Identification to identify the calling party. The master file has a plurality of records having a telephone number and a spatial key and is updated frequently. The client file has a plurality of records having a spatial key and a client telephone number. Methods of generating client file records for both radius and polygon defined service areas through an automated computer process are included in the present invention. Another embodiment of the system merges the records of the client file with the records of the master table to generate a single table to create a one table system. The one table system increases speed of the call routing process. A second embodiment of the one table system is provided by a special case of the client file build process which yields a caller telephone number to service location telephone number file. A further embodiment provides real-time processing in situations where high call volumes and transaction processing speed are not a major issue. The real-time processing system is simple to update and requires minimal storage.

72 Claims, 44 Drawing Sheets



US005956397A

United States Patent [19]

Shaffer et al.

[11] Patent Number: 5,956,397

[45] Date of Patent: *Sep. 21, 1999

[54] **AUTOMATIC ROUTING AND INFORMATION SYSTEM FOR TELEPHONIC SERVICES**

[75] Inventors: **James D. Shaffer**, Rancho Santa Fe, Calif.; **George G. Moore**, Great Falls, Va.

[73] Assignee: **Murex Securities, Ltd.**, Douglas, United Kingdom

[*] Notice: This patent is subject to a terminal disclaimer.

[21] Appl. No.: **09/100,052**

[22] Filed: **Jun. 19, 1998**

Related U.S. Application Data

[63] Continuation of application No. 08/659,318, Jun. 6, 1996, which is a continuation-in-part of application No. 08/598,392, Feb. 8, 1996, which is a continuation-in-part of application No. 08/365,325, Dec. 28, 1994, Pat. No. 5,506,897, which is a continuation of application No. 08/020,653, Feb. 22, 1993, abandoned.

[51] **Int. Cl.**[6] **H04M 3/42**

[52] **U.S. Cl.** **379/220**; 379/88.2; 379/127; 379/211

[58] **Field of Search** 379/220, 201, 379/207, 211, 219, 221, 127, 113, 114, 115, 212, 88.19, 88.2

[56] **References Cited**

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4,797,818	1/1989	Cotter	364/401
4,924,510	5/1990	Le	379/221
4,954,958	9/1990	Savage et al.	364/444
5,001,710	3/1991	Gawrys et al.	379/113
5,018,191	5/1991	Catron et al.	379/100
5,023,904	6/1991	Kaplan et al.	379/91

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OTHER PUBLICATIONS

Applied Telematics, Inc., "InstaLink," brochure, undated.

Peterson, James L. and Abraham Silberschatz, Second Edition, Section 3.3.3, pp. 70–71, "Operating System Concepts," undated.

Targus Information Corporation, brochure, Mar. 19, 1993, "DART Intelligent Call Processing."

Targus Information Corporation, brochure, Jan. 17, 1995, "DART Intelligent Call Processing."

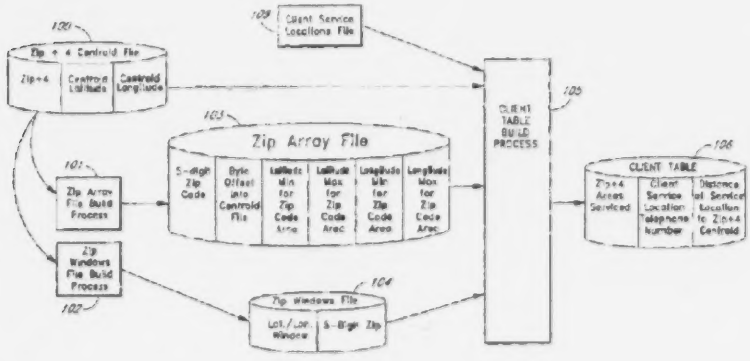
(List continued on next page.)

Primary Examiner—Krista Zele
Assistant Examiner—Scott Wolinsky
Attorney, Agent, or Firm—Knobbe, Martens, Olson & Bear, LLP

[57] **ABSTRACT**

A system and method for automatically and seamlessly routing telephone calls across a telephone network. The system includes a telephone network interface box having a computer, a master file and client file stored in the computer. The master file is dynamically linked to the client file at routing time to produce a selected client location telephone number which is transmitted across the telephone network. The system utilizes Automatic Number Identification to identify the calling party. The master file has a plurality of records having a telephone number and a spatial key and is updated frequently. The client file has a plurality of records having a spatial key and a client telephone number. Methods of generating client file records for both radius and polygon defined service areas through an automated computer process are included in the present invention. Another embodiment of the system merges the records of the client file with the records of the master table to generate a single table to create a one table system. The one table system increases speed of the call routing process. A second embodiment of the one table system is provided by a special case of the client file build process which yields a caller telephone number to service location telephone number file. A further embodiment provides real-time processing in situations where high call volumes and transaction processing speed are not a major issue. The real-time processing system is simple to update and requires minimal storage.

28 Claims, 44 Drawing Sheets



US005982868A

United States Patent [19]

Shaffer et al.

[11] **Patent Number: 5,982,868**

[45] **Date of Patent: *Nov. 9, 1999**

[54] **AUTOMATIC ROUTING AND INFORMATION SYSTEM FOR TELEPHONIC SERVICES**

[75] Inventors: **James D. Shaffer**, Santa Fe, Calif.; **George G. Moore**, Great Falls, Va.

[73] Assignee: **Murex Securities, Ltd.**, Douglas, United Kingdom

[*] Notice: This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).
This patent is subject to a terminal disclaimer.

[21] Appl. No.: **08/659,318**

[22] Filed: **Jun. 6, 1996**

Related U.S. Application Data

[63] Continuation-in-part of application No. 08/598,392, Feb. 8, 1996, which is a continuation-in-part of application No. 08/365,325, Dec. 28, 1994, Pat. No. 5,506,897, which is a continuation of application No. 08/020,653, Feb. 22, 1993, abandoned.

[51] **Int. Cl.**[6] **H04M 3/42**

[52] **U.S. Cl.** **379/220**; 379/127; 379/201; 379/211

[58] **Field of Search** 379/127, 142, 379/201, 202, 207, 210, 211, 216, 220, 219, 230, 265, 67, 88, 89, 93

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"Topological Integrated Geographic Encoding and Referencing System/Zone Improvement Plan," Oct. 1991, pp. 3–5.

(List continued on next page.)

Primary Examiner—Krista Zele
Assistant Examiner—Scott Wolinsky
Attorney, Agent, or Firm—Knobbe, Martens, Olson & Bear, LLP

[57] **ABSTRACT**

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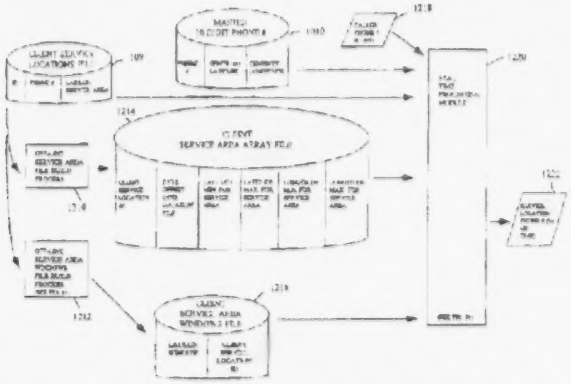
54 Claims, 44 Drawing Sheets



US006058179A

United States Patent [19]

Shaffer et al.

[11] Patent Number: 6,058,179

[45] Date of Patent: *May 2, 2000

[54] **ONE NUMBER, INTELLIGENT CALL PROCESSING SYSTEM**

[75] Inventors: **James D. Shaffer**, Rancho Santa Fe, Calif.; **George G. Moore**, Great Falls, Va.

[73] Assignee: **Murex Securities, Ltd.**, Douglas, United Kingdom

[*] Notice: This patent is subject to a terminal disclaimer.

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Related U.S. Application Data

[63] Continuation of application No. 08/748,192, Nov. 12, 1996, Pat. No. 5,901,214.

[60] Provisional application No. 60/019,526, Jun. 10, 1996.

[51] **Int. Cl.**[7] **H04M 3/42**

[52] **U.S. Cl.** **379/220**, 379/88.2, 379/211

[58] **Field of Search** 379/127, 201, 379/207, 211, 212, 219, 220, 221, 210, 265, 266, 88.18, 88.13, 67.1

[56] **References Cited**

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Primary Examiner—Scott Wolinsky

Attorney, Agent, or Firm—Knobbe, Martens, Olson & Bear LLP

[57] **ABSTRACT**

A one number, multi-application, intelligent call processing system provides service benefits to a caller, a servicing location and/or a vanity number advertiser during a call, parallel to the call and/or post call in an integrated common architecture. To provide these benefits, the system utilizes Voice Response Unit (VRU) technology in conjunction with the national telecommunications network connected via Computer Telephone Integration (CTI) to a virtual telephone number database containing a nation-wide master list of telephone numbers with thousands of attribute data items associated by Spatial Key linkage to each telephone number. The process of the invention is initiated by a caller dialing a selected telephone number to request information and/or services. Based on the number dialed, a caller or network provided 10 digit telephone number and VRU prompted for and received caller input, the system retrieves the application requested data from the virtual telephone number database. The application uses the retrieved information to direct the VRU to speak selected retrieved information to the caller that is desired by the caller or needs to be verified by the caller, to automatically connect the caller with a servicing location whose service area can be geographically defined as any size or shape and encompasses the caller provided telephone number's location, and/or to store portions of the received and retrieved information for later use.

32 Claims, 28 Drawing Sheets

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United States Patent [19]

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[54] **AUTOMATIC ROUTING AND INFORMATION SYSTEM FOR TELEPHONIC SERVICES**

[75] Inventors: **James D. Shaffer**, Rancho Santa Fe, Calif.; **George G. Moore**, Great Falls, Va.

[73] Assignee: **Murex Securities Limited**, Douglas, United Kingdom

[*] Notice: This patent is subject to a terminal disclaimer.

[21] Appl. No.: **09/211,137**

[22] Filed: **Dec. 14, 1998**

Related U.S. Application Data

[63] Continuation of application No. 08/659,318, Jun. 6, 1996, which is a continuation-in-part of application No. 08/598,392, Feb. 8, 1996, Pat. No. 5,848,131, which is a continuation-in-part of application No. 08/365,325, Dec. 28, 1994, Pat. No. 5,506,897, which is a continuation of application No. 08/020,653, Feb. 22, 1993, abandoned.

[51] **Int. Cl.**[7] **H04M 3/42**

[52] **U.S. Cl.** **379/220**, 379/211

[58] **Field of Search** 379/201, 207, 379/211, 219, 220, 221, 127, 113

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Primary Examiner—Scott Wolinsky

Attorney, Agent, or Firm—Knobbe, Martens, Olson & Bear, LLP

[57] **ABSTRACT**

A system and method for automatically and seamlessly routing telephone calls across a telephone network. The system includes a telephone network interface box having a computer, a master file and client file stored in the computer. The master file is dynamically linked to the client file at routing time to produce a selected client location telephone number which is transmitted across the telephone network. The system utilizes Automatic Number Identification to identify the calling party. The master file has a plurality of records having a telephone number and a spatial key and is updated frequently. The client file has a plurality of records having a spatial key and a client telephone number. Methods of generating client file records for both radius and polygon defamed service areas through an automated computer process are included in the present invention. Another embodiment of the system merges the records of the client file with the records of the master table to generate a single table to create a one table system. The one table system increases speed of the call routing process. A second embodiment of the one table system is provided by a special case of the client file build process which yields a caller telephone number to service location telephone number file. A further embodiment provides real-time processing in situations where high call volumes and transaction processing speed are not a major issue. The real-time processing system is simple to update and requires minimal storage.

46 Claims, 43 Drawing Sheets